

A REVISION OF THE GENUS *INDIGOFERA* (LEGUMINOSAE-PAPILIONOIDEAE) IN SOUTHEAST ASIA

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SUMMARY

In Southeast Asia (excluding India) 44 taxa are recognized, 39 species, of which four are newly described (*I. kerrii*, *I. luzoniensis*, *I. emmae*, and one unnamed species A, which will be treated by Nguyen Van Thuan, Paris), four subspecies, one of which is new (*I. sootepensis* subsp. *acutifolia*) and three are new combinations (*I. suffruticosa* subsp. *guatemalensis*, *I. trifoliata* subsp. *unifoliata*, *I. trita* subsp. *scabra*), and one variety which is a new combination (*I. spicata* var. *siamensis*). A key, descriptions and full synonymy are given as well as 4 distribution maps and 5 figures.

SHORT HISTORY OF THE GENUS

Linnaeus (1753) distinguished 3 species in the genus *Indigofera*. Under *I. tinctoria* (the later type species) he referred among others to *Anil* Bauhin (Hist. 2, 1651) and *Ameri* Rheede (Hort. Mal. 1, 1678).

Miller (1754) used the name *Anil* for the same genus and counted 3 (plurino-mial) species. He took this name from an earlier edition of his Gardeners' Dictionary,

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where he referred to *Anil* Bauhin. Therefore *Indigofera* L. and *Anil* Mill. were later declared as nomenclaturally identical. In the 8th edition of the Gardeners' Dictionary (1768) he changed *Anil* to *Indigofera*.

Adanson (1763) published the generic name *Indigo*. He probably copied this name from Isnard (around 1740), and mentioned in his index, besides others, *Ameri* Rheede, *Anil* Bauhin and '*Indigo fera*' Linnaeus. Isnard's publication was not traced, but also Ludwig (Def. Gen. Pl. 1760) refers *Indigo* to Isnard in his synonymy of *Indigofera*.

Desvaux (1813) described the genus *Sphaeridiophorum*, exclusively based on *Hedysarum linifolium* L.f., which was already transferred to *Indigofera* by Retzius (1786). Bentham (1865) treated it as a subgenus of *Indigofera*, followed by Baker (1871). Both Taubert (1894) and Baker f. (1926) transferred it to sectional rank.

In 1814, Desvaux validated the uninomial species name '*Brissonia*' of Necker (1790) as a genus with 3 species. He mentioned as generic synonyms *Reineria* Moench and *Tephrosia* Pers. (the latter as '*Thephrosia*'). In 1826 he transferred one of his original 3 species to the synonymy of *Indigofera senegalensis*, and the remaining 2 species were later recognized as representing present *Tephrosia*. Baker (1871) based his subgenus *Brissonia* of *Tephrosia* on these two species. Taubert (1894) reduced this to sectional rank, but he mentioned *Brissonia* also in the synonymy of *Indigofera*, which must have its cause in Bentham's citation (1865)-of *Brissonia* Desv. (1826) in the synonymy of *Indigofera* subg. *Amecarpus*, while Bentham probably meant to cite the species which Desvaux himself already transferred to *Indigofera*. Anyway, because of Desvaux' citation of *Reineria* and *Tephrosia* as synonyms, *Brissonia* must be considered a nomenclatorial synonym of *Tephrosia* (nom. cons.).

In 1832 G. Don described the new genus *Oustropis* with *O. microphyllus* as the only species, based upon *Lotus microphyllus* Hooker. Rafinesque (1836) had the same species as the type species of his (thus superfluous) genus *Tricoilendus*. Bentham (1865) placed *Oustropis* in the synonymy of his subgenus '*Euindigofera*'.

Also in 1832, Endlicher established the genus *Hemispadon*, which was reduced to *Indigofera* by Bentham (1865), followed by Taubert (1894).

In 1846 Hochstetter founded the genus *Eilemanthus*, also reduced by Bentham and followed by later authors. Schlechtendal (1847) spelled it as '*Elemanthus*'.

In 1846 Lindley published in a list of genera, drawn up by Bentham, the genus *Amecarpus* without description, only with a reference to the species *Indigofera senegalensis* Lamk. Harvey (1862) transferred *Amecarpus* to subgeneric rank under *Indigofera*, gave a short description and 7 species. Bentham (1865), Baker (1871) and Gillett (1958) agreed with subgeneric rank, but Taubert (1894) and Baker f. (1926) regarded it as a section.

In 1849 Bentham described the genus *Acanthonotus*, based on *Indigofera echinata* Willd., but reduced it to a subgenus in 1865, followed by Baker (1871) and Gillett (1958). Taubert (1894) treated it as a section, and Baker f. (1926) put it in the synonymy of sect. *Echinatae* W. & A., which has priority.

Jaubert and Spach (1857) established the genus *Indigastrum*. Bentham (1865) placed this in the synonymy of the subgenus '*Euindigofera*'; Baker f. (1926) regard-

ed it as a distinct 'group' within the subgenus '*Euindigofera*'; Gillett (1958) considered it a subgenus of *Indigofera*.

In 1865 Bentham described the genus *Microcharis* in the tribe Galegeae subtribe 'Galegeae', followed by later authors, until Gillett (1958) discovered the seemingly simple hairs as representing modified biramous hairs, and considered it a distinct subgenus in *Indigofera*. Also Hutchinson (1964) and Polhill (1981) agreed with its identity with *Indigofera*.

O. Kuntze (1891) inconsequently advanced the nomenclatorial starting point and stated that the oldest name for the genus was *Anila* Ludwig, and he transferred all species he knew to it. He also reinstated some of the above mentioned synonyms and changed the orthography of some of them: *Brissonia* Desv. to '*Brittonia*', *Oustropis* G. Don to '*Ototropis*', and *Eilemanthus* Hochst. to '*Ilemanthus*' (the latter two names in Post & Kuntze, 1903, as accepted genera). In our synonymy we have not mentioned Kuntze's renaming for reasons clearly put forward by Engler (1897).

Spencer Moore (1920) established the Madagascan genus *Vaughania*, the identity of which remained doubtful, until Polhill (1981) found it synonymous to *Indigofera*, together with the genus *Bremontiera* DC. from Réunion.

SYSTEMATIC POSITION OF THE GENUS

Polhill (1981) treated *Indigofera* with its two satellite genera *Cyamopsis* and *Rhynchotropis* together with the rather anomalous Madagascan genus *Phylloxylon* (hitherto of unknown affinity) in the tribe Indigofereae. The tribe is characterized by the combination of the following features: pulvinate leaves, biramous (malpighiaceous) hairs (mixed with other hair types or not), axillary simple racemes, explosive pollen release syndrome, decorated connective (apiculate, or glanduliferous, or with 1 or 2 tufts of hairs, or broadly expanded), endocarp often spotted with tannin deposits (called 'blotched' in this paper), more or less correlated with pollen characters (thickened endexine with a columellar infratectum) and chemical characters (presence in seeds of the free amino acid canavanine, sometimes combined with indospicine).

None of the gross-morphological characters is strictly unique. The biramous hairs are shared by part of the species of *Astragalus* (Galegeae s.s.). A pulvinate leaf rachis is characteristic of Tephrosieae, Robinieae and the woody genera of the Galegeae s.s. besides other tribes. Axillary racemes are typical of Robinieae and part of the Galegeae s.s. An explosive pollen release syndrome is not restricted to certain tribes but more characteristic of parts of the periphery of Polhill's scheme (1981, p. 199). A decorated connective is rarer in the surrounding tribes, but occurs in *Afgekia* (Tephrosieae).

Subjective consideration of the similarities and differences between the above mentioned tribes gives the feeling that tribal rank is possibly too elevated for them. The classical arrangement as subtribes of a broader tribe Galegeae (Bentham, 1865; Taubert, 1894) reflects the mutual affinities better. Polhill (1981) considered *Indigo-*

fera and its satellites 'rather isolated' within the subfamily, but one could argue that, on account of the diverse character links, only the *combination* of characters is distinctive for *Indigofera* and its allies, and that the group is phylogenetically 'broadly sessile', even contributing to the already strong relationships between the Tephrosieae, the Galegeae s.s., and the Robinieae.

CHARACTERS

Vegetative parts — All examined species are either treelets, or shrub(let)s, or herbs, in the latter case always woody at base. Many species are recorded to have root nodules (Allen & Allen, 1981).

The indument consists in all species of characteristic unicellular biramous (malpighiaceus) hairs. In most species both arms are equally long and adpressed to the epidermis (e.g. *I. tinctoria*). The arms can also be more or less spreading. Some species have hairs with unequally long arms (e.g. *I. aralensis*), and the extreme condition is that one arm is nearly completely reduced and the other one spreading (e.g. *I. hirsuta*). Some species (in Southeast Asia only *I. colutea*) have besides the biramous hairs also pluricellular hairs with a glandular apex, which may be caducous. A few species have, between the biramous hairs of the leaflets below, sessile hyaline yellow to black multicellular glands (e.g. *I. glandulosa*). In dried material these glands are usually disc-shaped, but in living material they are probably more or less globular.

The leaves are imparipinnately compound, or trifoliolate, or unifoliolate, or simple. In this treatment we called leaves unifoliolate when a reduced rachis is distinct, usually with 2 stipellae on its apex, while simple leaves lack any trace of rachis and stipellae. The rachis is always pulvinate. A distinct ultrajugal part of the rachis is present except in most specimens of *I. trifoliata*, which have sessile terminal leaflets. The petiolules are entirely pulvinate and much shorter than the leaflets. Stipules are persistent or caducous, like the stipellae and bracts hairy below ('outside') and glabrous above ('inside'). They are narrowly triangular and seemingly adnate to the base of the leaf rachis. In fact the pulvinus is placed on a sort of 'pulpit' on the edge of which the stipules are attached. The articulation between this 'pulpit' and the pulvinus is usually indistinct. Stipellae are generally present, but in some species (e.g. *I. glabra*) always absent.

The leaflets are opposite, or subopposite, or alternate. In some species these positions are constant, but in others it varies from opposite to alternate within one leaf. The shape of the blades ranges from linear to orbicular, but within a species the variation is always between narrower limits. The margin is always entire, and the apex always mucronate. Nerves are generally very indistinct; they are conspicuous in e.g. *I. bella*, *I. brunoniana*, and *I. caloneura*.

Inflorescence — The flowers are arranged in axillary true racemes. The length of these and the number of flowers differ considerably between the species. The racemes can be very short and few-flowered as in *I. cordifolia*, or long with many flowers as in *I. laxiflora*. The bracts are usually narrowly triangular with an acute apex, but

sometimes triangular, or cuspidate (e.g. in *I. cassioides*). In this species there are sometimes empty bracts at the base of the raceme. The length of the bracts can vary considerably within one species. Bracteoles are always absent.

Flower — *Indigofera* has papilionate flowers 3–20 mm long. The calyx is campanulate and 5-toothed, the teeth are subequal, the vexillary ones the shortest and the carinal one the longest. Their shape varies from deltoid to narrowly triangular. The length of the teeth provides a good discriminating character between the species. The standard blade varies in shape from orbicular to elliptic; the claw is relatively small and callosities or auricles are absent. The back of the standard is strigose in most species, except in *I. cassioides* and *I. atropurpurea*. The wings are slightly adherent to the keel petals by means of lateral pockets and furrows. In most species the wings are glabrous, with ciliate margins. The keel petals are partly valvately connate along the lower margin, from about halfway to the apex. The wings are shorter than or equal to the keel. In some species latex containing glands occur on the back of the standard and on the keel petals (e.g. in *I. trifoliata*). The stamens are diadelphous, with a free vexillary stamen, the other 9 are connate in a gutter-like sheath around the pistil. The stamens are different of length, alternately longer and shorter and also gradually slightly longer to the carinal side. The vexillary stamen is always the shortest. The connate part of the filaments is always about 4/5th of their total length. The anthers are uniform, all fertile with an apiculate connective. In some species the anthers have tufts of simple hairs at the base and/or at the apex of the connective. The ovary is not stipitate, gradually merging into the style, which is curved upwards. The stigma is capitate. The ovary can be glabrous or strigosely beset with biramous hairs. The indument usually develops in a later stage. The style and the stigma are always glabrous; in some species latex glands occur (e.g. in *I. trifoliata*). The number of ovules varies from 1 to 20. The variation within a species is never more than 5; 2–3 is normal. Normally most ovules develop into seeds, except in *I. nummularifolia*, where only 1 of the 2 ovules develops into a seed.

Pollen — Vishnu-Mittre & Sharma (1962) report some difference in tectum types and apertures in *Indigofera*. See also Ferguson & Skvarla (1981) and Ferguson & Strachman (1982).

Fruit — The pods are dehiscent or indehiscent. They can be descending, or spreading, or ascending and these positions are used as discriminating characters. The pod can be linear to globose, straight to arcuate, rounded to quadrangular in cross-section, beset with biramous hairs or rarely glabrous. In *I. trifoliata* the pod is slightly winged along the sutures. In *I. glandulosa* these wings are broader and fringed. *I. nummularifolia* has falcate pods with curved spines. The '*I. trifoliata*-group' has disc-shaped glands on their pods as they have on the lower surface of the leaflets. *I. colutea* has spreading gland-tipped hairs on the pods.

Many species of *Indigofera* show a peculiar way of disconnection of the pod from its receptacle. The broadened base remains connected to the receptacle as a (sub)-sessile cup. A circumferent articulation is not visible from the outside, but its place is

generally marked by the indument: the persistent base is more glabrous and/or paler coloured than the caducous part of the pod. Whether this feature is of any taxonomic value may appear from future investigation. We discovered it rather late during our study, but once detected, the character is distinct to various degrees. Generalization on account of the limited number of species studied here seems inappropriate.

The endocarp is septated between the seeds, which can have dark-red, brown, or blackish spots. Those spots are groups of swollen coloured cells rich in tannin (Gillett, 1958, p. 2) and they can form pits in the seeds.

The seeds are globose to cylindric, truncate, compressed or quadrangular. In *I. zollingeriana* the seeds are transversely turned in the basal-apical plain over 90° , so that they are arranged like a pile of coins.

Seedling — According to De Vogel (1979) the seedlings of *Indigofera* belong to the *Sloanea* type and subtype. Germination starts with the emergence of the radicle, which is pushed out of the envelopments by the elongating, epigeal hypocotyl. While the cotyledons are still enclosed by the seed coat, there is a short rest in the development of the seedling. Endosperm is absent. The cotyledons are thick and relatively short-persistent. The plumule develops after this resting stage and forms in a \pm long first internode, with two fully developed, opposite leaf-like eophylls, followed by a second resting stage. Further growth starts with development of the terminal bud.

CYTOLOGY

Darlington & Wylie (1945) and Frahm-Lelieveld (1960, 1962) counted some chromosome numbers of *Indigofera*. These chromosome counts show that the greater part belongs to a polyploid series of $n = 8$. A few extra-Asiatic species and the closely allied genus *Cyamopsis* has $2n = 14$ probably due to aneuploidy. Of the species dealt with in this paper, the following are diploid ($2n = 16$): *I. arrecta*, *I. colutea*, *I. cordifolia*, *I. hirsuta*, *I. linnaei*, *I. suffruticosa* subsp. *suffruticosa*, *I. tinctoria*, *I. trita* subsp. *subulata*. Tetraploid ($2n = 32$) are: *I. zollingeriana* (*I. teysmannii*), *I. spicata*. Larsen (1968–69) added *I. caloneura* to this group. Hexaploid ($2n = 48$) are: *I. decora*, *I. dosua*.

Frahm-Lelieveld (1962) found general agreement between the infrageneric arrangement of Gillett (1958) and the number and size of the chromosomes. Near the centre of Gillett's scheme occur more woody species with $2n = 16$ and relatively large chromosomes, while either small chromosomes or $2n = 14$ are found in the periphery in generally more herbaceous species. Subsection *Tinctoriae* is a rather mixed 'central' group with both large and medium-sized chromosomes, but with a constant number of $2n = 16$.

TAXONOMY

Indigofera is a large genus with many species; the estimates run from 200 to 800 species. Several authors gave subdivisions (Bentham, 1865; Baker, 1871; Taubert,

1894; Baker f., 1926; Gillett, 1958). The first four authors presented 4 subgroups; some gave subgeneric ranks, others treated them as sections. The subdivisions are mainly based on the shape of the pod and the number of ovules:

- *Acanthonotus* ('Echinatae'): pod falcate with curved spines; 2 ovules, 1 seed, e.g. *I. nummularifolia*.
- *Sphaeridiophorum*: pod spherical; 1 ovulum, e.g. *I. linifolia*.
- *Indigofera* ('Euindigofera'): pod rounded in cross-section; 1–20 ovules, e.g. *I. tinctoria*.
- *Amecarpus*: pod flattened; 1–20 ovules, e.g. *I. senegalensis* Lamk.

The third group is further subdivided into several groups, which differ with the author.

Gillett (1958) gave a different classification for the African species. He distinguished 5 subgenera, 3 of which are mentioned above (*Acanthonotus*, *Indigofera*, *Amecarpus*). He reduced the genus *Indigastrum* to subgenus, which was previously already proposed in various ways. He also reduced the genus *Microcharis* to subgenus. *Microcharis* was treated by many authors as a distinct genus mainly because its very unequally branched biramous hairs were interpreted as simple hairs. Gillett based his subgenera mainly upon the presence or absence of an indumentum on the standard and on the shape of the pod. He subdivided subg. *Amecarpus* into two sections and subg. *Indigofera* into three sections. He subdivided the section *Indigofera* of subg. *Indigofera* further into 19 subsections, mainly on the position and number of leaflets together with the position of the pod (either descending, spreading, or ascending).

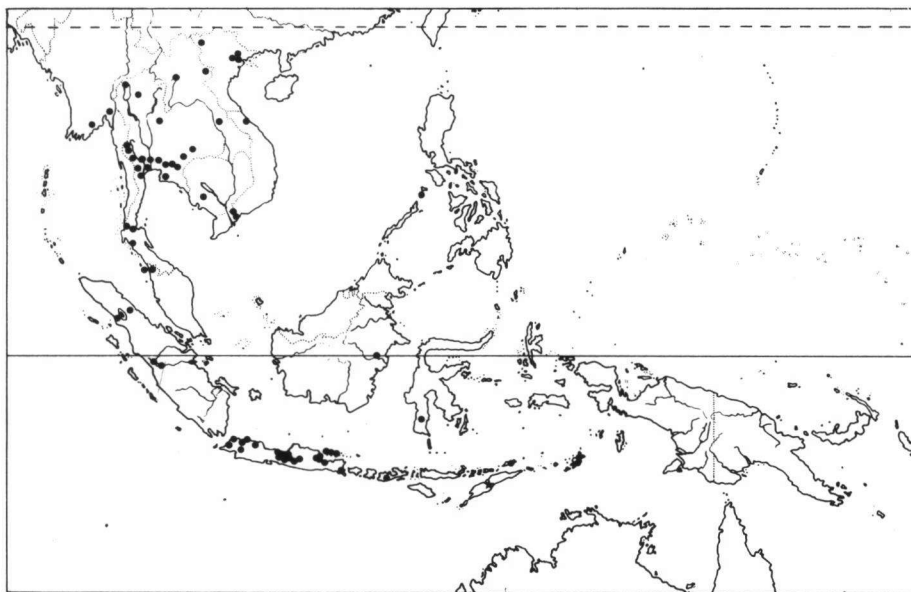
It appeared not possible to fit all the Southeast Asiatic species of *Indigofera* easily in Gillett's scheme. Additional to Gillett's groups we can indicate a few more groups of more closely related species:

1. *I. trifoliata*, *I. glandulosa* and *I. squalida* have disc-shaped glands on the lower surface of the leaflets and on the pods. They possess latex glands on the keel petals, on the basal area of the style, and sometimes also on the back of the standard.
2. On account of the uncinatate pods and the rather large and conspicuously veined leaflets, we can distinguish a group consisting of *I. caloneura*, *I. brunoniana* and *I. bella*, all from Burma, Thailand, Laos and Vietnam.
3. *I. nummularifolia* seems isolated on account of the rather different spined pod with only one ovulum developing to seed.
4. *I. colutea* is more remotely allied by its spreading gland-tipped hairs.

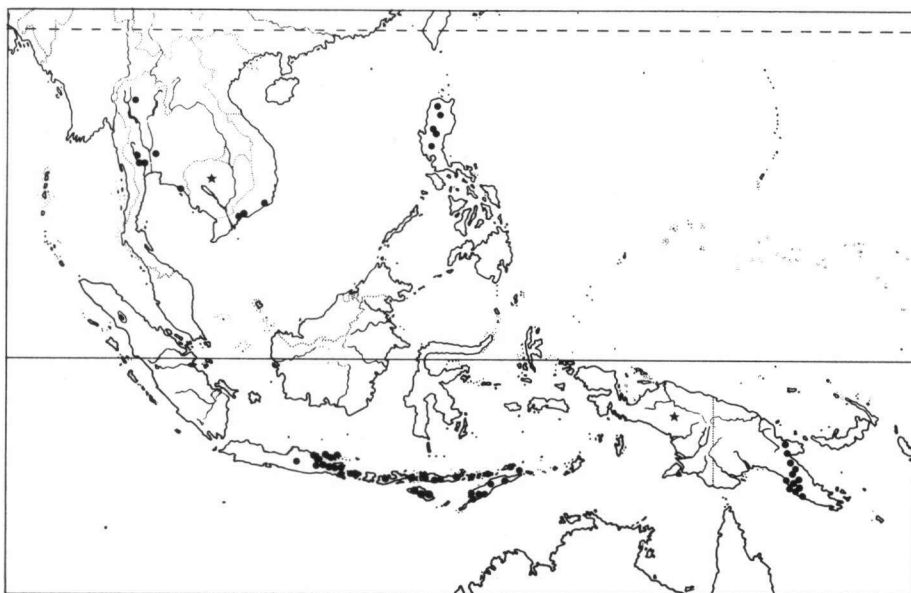
Our treatment is not monographical and due to lack of correlating characters we refrain from any formal subdivision. We prefer to leave the necessary emendations to Gillett's scheme to a future monographer of the entire genus.

DISTRIBUTION

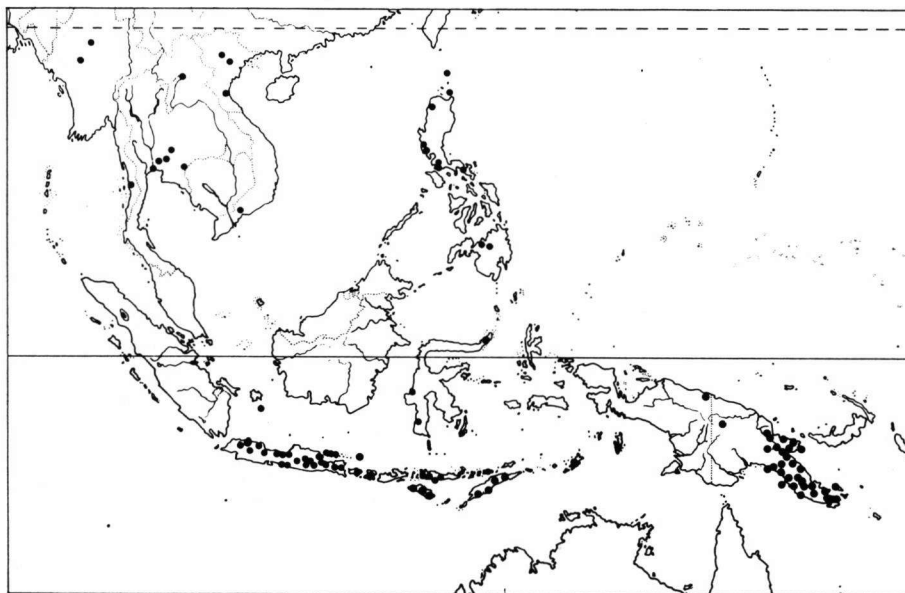
The genus *Indigofera* is widely distributed in the tropics and subtropics of the Old and the New World. The greater part of the species occurs in Africa, but the southern



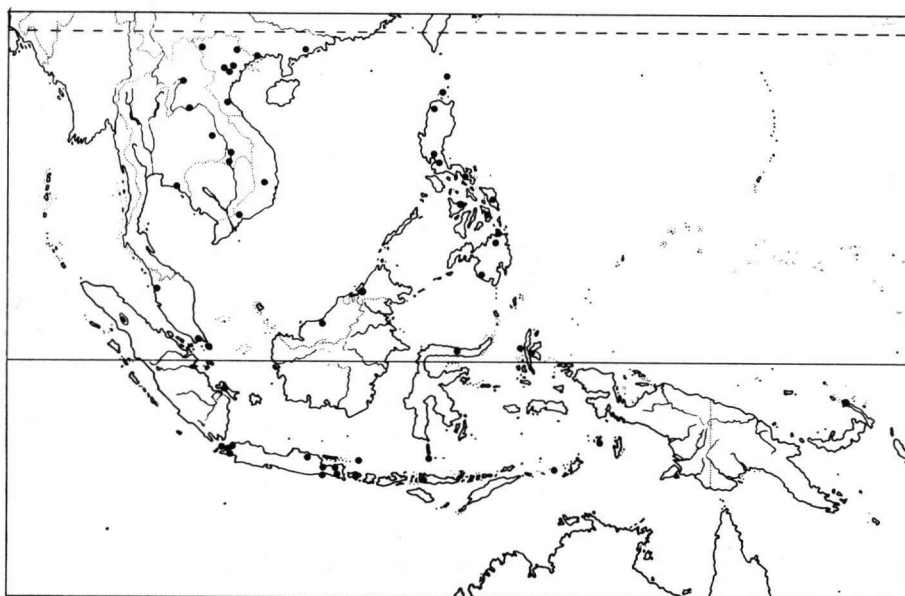
Map 1. ● Distribution of *Indigofera galegoides* DC. (★ exact locality not known).



Map 2. ● Distribution of *Indigofera linifolia* (L. f.) Retz. (★ exact locality not known).



Map 3. ● Distribution of *Indigofera trifoliata* L.



Map 4. ● Distribution of *Indigofera zollingeriana* Miq.

Himalaya area is also comparatively rich in species. The absence of the genus in the Mediterranean region is remarkable, as it is strongly represented in those parts of the Cape Province which have a Mediterranean climate (Gillett, 1958). *Indigofera* also occurs in the adjacent western Asiatic area.

Many species have been introduced into the area under consideration. Definitely introduced are *I. arrecta* (in 1860–65 from Natal), *I. suffruticosa* subsp. *guatemalensis* (from Guatemala or Mexico in 1872), and *I. spicata* (from India in 1923). The latter species also occurs in the mainland of Southeast Asia, though it is unknown whether it is introduced or indigenous there. *I. spicata* var. *siamensis* occurs only in Thailand and Vietnam. Also introduced are *I. colutea*, *I. cordifolia*, *I. glandulosa*, *I. oblongifolia*, *I. suffruticosa* subsp. *suffruticosa*, and *I. trita* subsp. *scabra*; date and origin are unknown. *I. decora* is introduced on Luzon from China.

A few species, *I. galeoides* (map 1), *I. hirsuta* and *I. zollingeriana* (map 4) have a wide distribution and are apparently indifferent to climate (drought class 1, Van Steenis, 1961). *I. galeoides* occurs from India to West Malesia, extending to Sulawesi (Celebes), and the Lesser Sunda Islands. Like *Tephrosia*, most species occupy either a geographically restricted area (15 spp., most introduced ones) or are bound to monsoon areas (also the introduced ones). Five species (e.g. *I. trifoliata*, map 3) prefer a moderately dry monsoon climate (drought classes 2–4), and three species, *I. colutea*, *I. linifolia* (map 2) and *I. trita* an extreme dry monsoon climate (drought classes 5–6).

ECONOMIC USES

Unless specified, information is abstracted from Heyne (1950), Burkill (1935), and Watt (1890).

Covercrops and green manures — The following species have been recommended: *I. arrecta*, *I. hirsuta*, *I. spicata*, *I. suffruticosa* and *I. tinctoria*.

Fodder — The following species have been reported as valuable fodder: *I. dosua*, *I. hirsuta*, *I. linnaei*, *I. oblongifolia* and *I. spicata*.

Dyes — Important sources of indigo were or are: *I. arrecta*, *I. suffruticosa* subsp. *suffruticosa* and subsp. *guatemalensis* and *I. tinctoria*. Dalziel (1937) reported that *I. hirsuta* yields indigo in West Africa.

Human food — Watt (1890) recorded that the seeds of *I. cordifolia*, *I. glandulosa*, *I. linifolia* and *I. linnaei* are used in times of scarcity and famine in India. The seeds of *I. glandulosa* and of *I. trifoliata* are recorded as a nutritive tonic. Furthermore the flowers of *I. dosua* are used as a kitchen herb in India, and the flowers of *I. cassioides* as a vegetable.

Toxicity — Many species of *Indigofera* contain toxic compounds. Duke (1981) recorded toxic organic nitro compounds in 26 species of *Indigofera*. The following species, dealt with in this paper, have been shown to be definitely toxic or are sus-

pected to be toxic: *I. galegoides* contains cyanides (Romburgh, 1903); *I. hirsuta* is possibly poisonous and can severely irritate the hooves of animals (Duke, 1981); *I. linifolia* is regarded by Ewart (as '*I. linophylla*') as highly poisonous (Hurst, 1942); *I. linnaei* is the cause of a horse disease known in Australia as 'Birdsville disease' but sheep and cattle can eat it apparently without any harmful results (Gardner, 1956). *I. spicata* has been introduced into the Hawaiian Islands as a pasture legume and has caused trouble to cattle there: loss of appetite, apathy, delayed oestrus and sometimes abortion. In Australia it is reported that diploid forms of *I. spicata* from Africa are not poisonous and form a good fodder but that tetraploid forms of *I. spicata* from Ceylon and India are poisonous (Verdcourt & Trump, 1960). The toxicity is due to indospicine, a hepatotoxic amino acid that interferes with both the synthesis and the utilisation of arginine; this species also synthesizes the toxic 3-nitro-propionic acid (Duke, 1981). Gillett (1958) reported that *I. tinctoria* and *I. suffruticosa* subsp. *suffruticosa* have been recorded as 'perhaps or sometimes' poisonous.

Medical uses — Watt (1890) recorded that the following species are used medically: *I. cassioides*, *I. linifolia*, *I. linnaei* and *I. tinctoria*. *I. linifolia* is used medically in 'febrile eruptions'. The juice of *I. linnaei* is used as an antiscorbutic and diuretic and is considered 'alterative in old venereal affection'. The extract of *I. tinctoria* is used against epilepsy and nervous disorders, as well as in cases of bronchitis and as an ointment in sores. A decoction of the roots of *I. cassioides* is given for cough and a powder of it is applied externally for pains in the chest.

According to information on labels, also *I. dosua* and *I. suffruticosa* subsp. *suffruticosa* are used medically. In Laos, the leaves of *I. dosua* are applied to boils and in Malaya a decoction of the roots of *I. suffruticosa* is taken for stomach-ache. In Perak, crushed leaves in cold water are used as a febrifuge and the juice of the plants is applied for diarrhoea. In the Philippines, a decoction of the fresh leaves of *I. hirsuta* is given in cases of diarrhoea and stomach complaints (Quisumbing, 1951). See also Duke (1981).

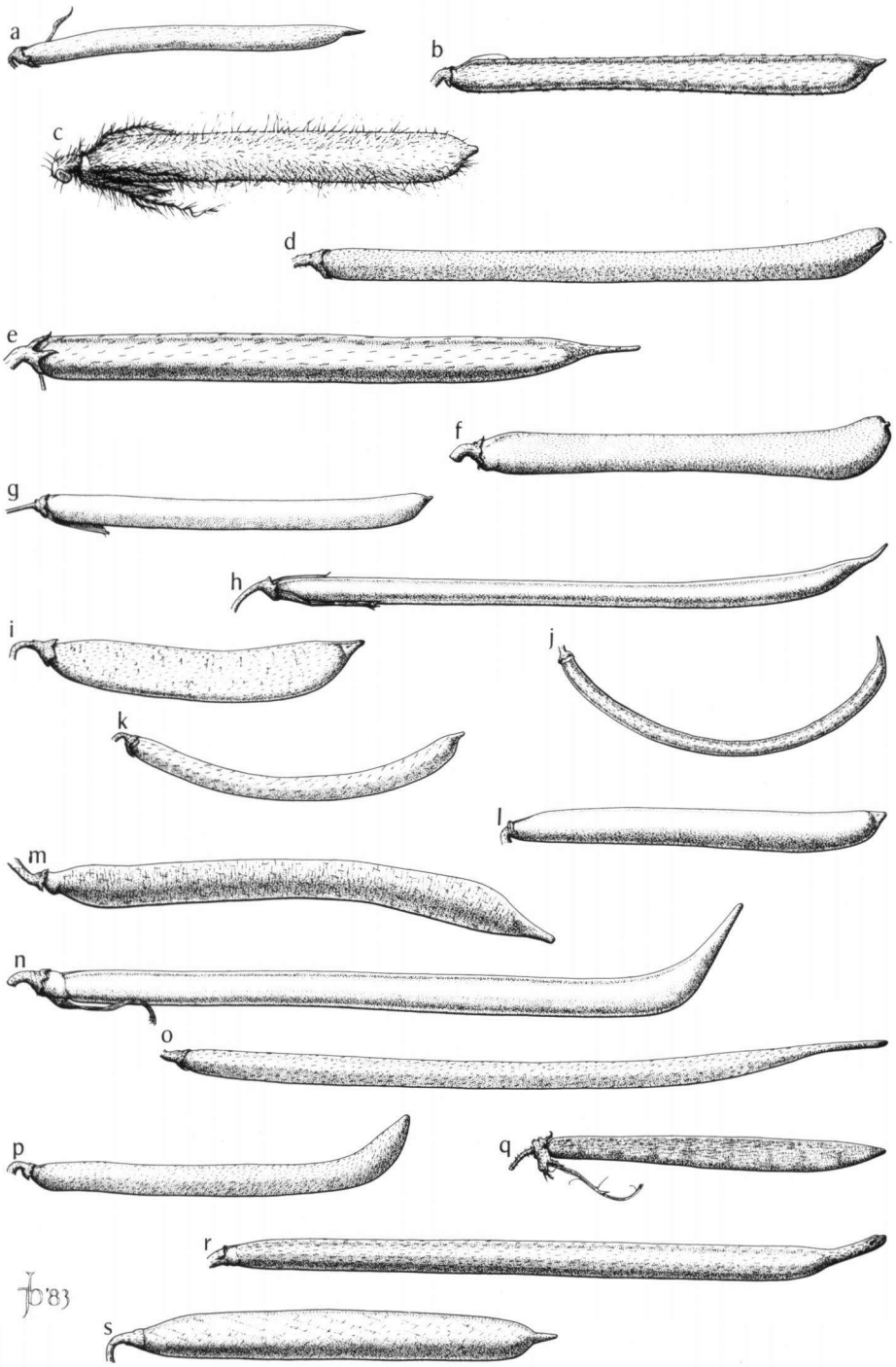
Other uses — The twigs of *I. atropurpurea* are employed for basket-work and bark bridges (Watt, 1890).

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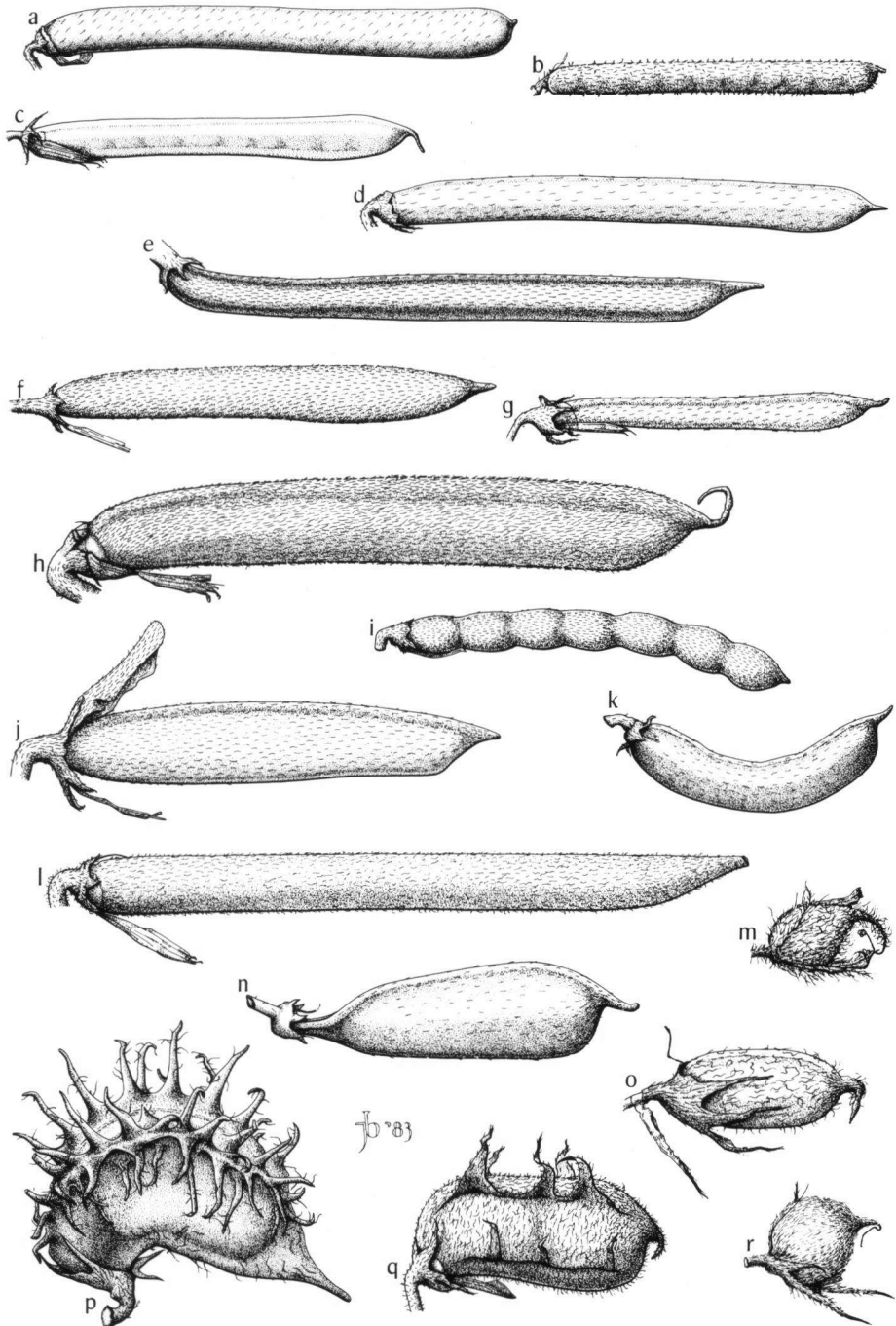


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Fig. 1. Pods of *Indigofera*. a. *I. cassioides*, $\times 1.5$ (BKF 16338, L); b. *I. trifoliata*, $\times 3$ (Coert 517, L); c. *I. hirsuta*, $\times 3$ (NGF 24399, L); d. *I. caloneura*, $\times 3$ (BKF 46375, L); e. *I. spicata* subsp. *spicata*, $\times 3$ (Holstvoogd 373, L). f. *I. brunoniana*, $\times 1.5$ (Lace 5519, K); g. *I. lacei*, $\times 1.5$ (Meebold 8065, K); h. *I. laxiflora*, $\times 3$ (Garrett 739, L); i. *I. luzonensis*, $\times 1.5$ (BS 5043, L); j. *I. trita* subsp. *scabra*, $\times 1.5$ (Faulkner 4748, L); k. *I. tinctoria*, $\times 1.5$ (Backer s.n., L); l. *I. atropurpurea*, $\times 1.5$ (Teijsmann s.n., L); m. *I. zollingeriana*, $\times 1.5$ (Bunnemeijer 6456, L); n. *I. bella*, $\times 1.5$ (Lace 4416, K); o. *I. galeoides*, $\times 1.5$ (Koorders 35314, L); p. *I. caudata*, $\times 1.5$ (Poilane 2206, P); q. *I. parkesii*, $\times 1.5$ (Senn v. Basel s.n., L); r. *Spec. A*, $\times 1.5$ (Poilane 25055, P); s. *I. sootepensis*, $\times 3$ (Maxwell 76-588, L).



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Fig. 2. Pods of *Indigofera*. a. *I. arrecta*, × 3 (Popta 00700/157, L); b. *I. colutea*, × 3 (Backer 19977, L); c. *I. glabra*, × 3 (Rudd e.a. 3141, L); d. *I. nigrescens*, × 3 (Lace 5518, K); e. *I. trita* subsp. *trita*, × 3 (Subramanian 1769, L); f. *I. wightii*, × 3 (Wight 664, L); g. *I. reticulata*, × 3 (Delavay 1964, K); h. *I. squalida*, × 6 (van Beusekom e.a. 3824, L); i. *I. oblongifolia*, × 3 (Backer 15210, L); j. *I. minbuensis*, × 6 (Shaik Mokim 1158, K); k. *I. suffruticosa* subsp. *suffruticosa*, × 3 (van Zanten 1062, L); l. *I. dosua*, × 3 (BKF 52126, L); m. *I. cordifolia*, × 6 (Kooy 851, L); n. *I. suffruticosa* subsp. *guatemalensis*, × 6 (Schiffner 2084, L); o. *I. linnaei*, × 6 (Schmutz 2106, L); p. *I. nummularifolia*, × 6 (Thorel s.n., E); q. *I. glandulosa*, × 6 (Backer 36151, L); r. *I. linifolia*, × 6 (Backer 20816, L).

SYSTEMATIC PART

INDIGOFERA

- Indigofera* L., Sp. Pl. (1753) 751; Benth. in Benth. & Hook., Gen. Pl. 1 (1865) 494; Baker in Oliver, Fl. Trop. Afr. (1871) 65; Taub. in E. & P., Nat. Pfl. Fam. 3, 3 (1894) 259; Baker f., Legum. Trop. Afr. (1926) 95; Gillett, Kew Bull., Add. Ser. 1 (1958) 1; Hutch., Gen. Fl. Pl. 1 (1964) 400; Polhill in Polhill & Raven, Adv. Legum. Syst. (1981) 289. – *Anil* Mill., Gard. Dict. ed. 4 (1754) [95]. – *Indigo* Adans., Fam. Pl. 2 (1763) 326. – *Anila* (Ludwig ex) O. Kuntze, Rev. Gen. Pl. 1 (1891) 159. – Type species: *I. tinctoria* L.
- Sphaeridiophorum* Desv., J. Bot. 1 (1814) 125, t. 6, f. 35. – Type species: *Sphaeridiophorum linifolium* (L.) Desv.
- Oustropis* G. Don, Gen. Syst. 2 (1832) 214. – ‘*Ototropis*’ Post & O. Kuntze, Lex. (1903) 408 (sphalm.), non Nees. – *Tricoilendus* Rafin., Fl. Tellur. 2 (1836) 97, nom. superfl. – Type species: *Oustropis microphyllus* (Hook.) G. Don.
- Hemispadon* Endl., Flora 15, 2 (1832) 385. – Type species: *Hemispadon pilosus* Endl.
- Eilemanthus* Hochst., Flora 29 (1846) 593. – ‘*Elemanthus*’ Schlechtend., Bot. Zeit. 5 (1847) 150. – ‘*Ilemanthus*’ Post & O. Kuntze, Lex. (1903) 297. – Type species: *Eilemanthus strobilifera* Hochst.
- Amecarpus* Benth. in Lindl., Veg. Kingd. (1846) 554, nom. nud.
- Acanthonotus* Benth. in Benth. & Hook., Niger Fl. (1849) 293. – Type species: *Acanthonotus echinatus* (Willd.) Benth.
- Indigastrum* Jaub. & Spach, Illustr. 5 (1857) 101. – Type species: *Indigastrum deflexum* (Hochst. ex A. Rich.) Jaub. & Spach.
- Microcharis* Benth. in Benth. & Hook., Gen. Fl. Pl. 1 (1865) 501. – Type species: *Microcharis tenella* Benth.
- Vaughania* S. Moore, J. Bot. 58 (1920) 188. – Type species: *Vaughania dionaeaeifolia* S. Moore.

Treelets, shrub(let)s, or herbs, woody at base. Branches spreading or ascending. Indument of adpressed to spreading biramous hairs with equally long or (very) unequally long arms, in some species mixed with spreading glandular hairs or with sessile hyaline yellow to black disc-shaped glands. *Leaves* alternate, either imparipinnately compound, or trifoliolate, or unifoliolate, or simple. Stipules usually persistent. Rachis pulvinate at base, furrowed above; ultrajugal part usually distinct. Stipellae absent or present. Petiolules entirely pulvinate, hairy. *Leaflets* (sub)opposite or alternate, linear to orbicular; the terminal one often somewhat larger than the lateral ones; base rounded to cuneate; margins entire; apex truncate to obtuse and mucronate; both surfaces hairy. Midrib sunken above and raised below; nerves usually inconspicuous, when distinct forming marginal arches. Racemes axillary. *Flowers* up to 20 mm long, pedicelled, always single in the axil of a bract. Bracteoles absent. Calyx glabrous inside; cup campanulate; teeth 5. Standard blade elliptic to orbicular, without appendages, strigose to tomentose or rarely glabrous outside, sometimes with latex glands, inside always glabrous; claw minute. *Wings* free, shorter than or as long as the keel, spathulate, usually glabrous; blade usually with an upper auricle at base, always with a lateral furrow; margin ciliate; claw short. *Keel petals* falvate, valvately connate along lower margin from halfway to the apex; blade usually with an upper auricle at base, always with a lateral, recurved pocket (except *I. aralensis*

with a perpendicular short one), usually with a basal and apical hairy area outside, in some species here also with latex glands; upper margin ciliate; claw short. Vexillary *filament* free, the other 9 connate, alternately shorter and longer and gradually longer towards the lower side. Anthers uniform, all fertile; connective apiculate, sometimes with tufts of hairs at its base, sometimes also at its apex, in extra-Malesian species sometimes with an apical gland. Disc indistinct. *Ovary* not stipitate, spherical to linear, glabrous or hairy, sometimes with some latex glands in the basal area of the style. Style curved upwards, glabrous; stigma capitate, glabrous. Ovules 1–20. *Pod* either descending, or spreading, or ascending, dehiscent or not, linear to globose, straight or upcurved, round or quadrangular in cross-section, sometimes with longitudinal wings or crests, rarely with curved spines, usually hairy outside, corresponding with the general indument; disconnecting by means of a more or less distinct circumferent articulation near the base; this articulation generally marked by the indument, the persistent basal ‘cup’ usually more glabrous and/or paler coloured outside; apex beaked and sometimes uncinat; endocarp septate between the seeds, blotched or not. *Seeds* globose to ellipsoid, or cylindric, or quadrangular.

Note. Nomenclature and typification proved to be complicated. In the framework of this regional revision time, necessary for piercing into the depths of all sources, was lacking. We present a kind of ‘optimally convenient’ account of the nomenclatural bases, and inevitably some overlooked names will be found in the future.

KEY TO THE SPECIES AND INFRASPECIFIC TAXA

- 1a. All leaves simple or unifoliolate 2
- b. Leaves imparipinnately compound, sometimes also with a few unifoliolate ones 9
- 2a. Leaflets with disc-shaped or globular glands (magn. $\times 30$), these sometimes caducous; keel and ovary with latex glands 3
- b. Leaflets without such glands; keel and ovary without latex glands 4
- 3a. Leaves simple (stipellae absent), 7–22 mm broad; arms of biramous hairs often curved upwards; racemes 1–2 cm long; ovary hairy; main root tuberous 31. *I. squalida*
- b. Leaves unifoliolate (stipellae present), 2–7 mm broad; biramous hairs adpressed; rachis of racemes 4–5 mm long; ovary glabrous; main root not tuberous 34b. *I. trifoliata* subsp. *unifoliolata*
- 4a. Leaves simple (stipellae absent), not conspicuously veined beneath; racemes 0.2–5.0 cm long; ovules 1–5; pod 2–10 mm long, straight or globose 5
- b. Leaves unifoliolate (stipellae present), conspicuously veined beneath; racemes 7–15 cm long; ovules 11–12; pod 14–50 mm long, uncinat 8
- 5a. Leaves 40–80 mm long; ovules (2–)4–5, pod straight, 10 mm long 22. *I. minbuensis*
- b. Leaves 3.5–40 mm long; ovules 1–2; pod falcate and echinate or spherical to oblong, 2–7 mm long 6

- 6 a. Pod falcate and echinate, descending; racemes 4–5 cm long; dried plant with greenish appearance 24. *I. nummularifolia*
 b. Pod spherical or oblong, not echinate, spreading or ascending; rachis of racemes 2–15 mm long; dried plant with whitish appearance 7
- 7 a. Leaf blade cordate, 3.5–4 mm long, with sometimes unequally long branched hairs; racemes 2–3 mm long; ovary with hairs; endocarp blotched
 9. *I. cordifolia*
 b. Leaves elliptic to linear, 5–40 mm long, with equally long branched hairs; racemes up to 15 mm long; ovary glabrous; endocarp not blotched
 19. *I. linifolia*
- 8 a. Leaflets glabrous above, with biramous hairs with unequally long arms below; stipules 3.5–5 mm long; wings nearly as long as the keel 6. *I. caloneura*
 b. Leaflets with adpressed biramous hairs with equally long arms on both sides; stipules c. 1 mm long; wings half the length of the keel 5. *I. brunoniana*
- 9 a. Leaves (1–)3-foliolate 10
 b. Always some leaves with 5 or more leaflets, but sometimes combined with 1–3-foliolate leaves 14
- 10 a. Leaflets 3, combined with unifoliolate ones 11
 b. All leaves trifoliolate 12
- 11 a. Stipules 3.5–5 mm long; leaves at basal part of branches trifoliolate, at apical part unifoliolate; leaflets 5–20 by 2.5–12 cm; calyx teeth deltoid; pod uncinata
 5. *I. brunoniana*
 b. Stipules 1.5–2.5 mm long; leaves (1–)3-foliolate; leaflets 1–3 by 0.5–1.5 cm; calyx teeth narrowly triangular; pod not uncinata 35a. *I. trita* subsp. *trita*
- 12 a. Leaflets with disc-shaped or globular glands below (magn. $\times 30$); standard and ovary with latex-glands; ovules (1–)2–6; racemes 2–12 mm long; pod 5–15 mm long, not rhomboid in cross-section, descending 13
 b. Leaflets without such glands; standard and ovary without latex glands; ovules 8–10; racemes 25–20(–80) mm long; pods 17–25 mm long, rhomboid in cross-section, spreading 35a. *I. trita* subsp. *trita*
- 13 a. Stipules 3–4 mm long; glands on leaflets brown to black; biramous hairs with unequally long arms; ovary 1- or 2-ovuled, hairy; pod globose and with 4 fringed wings, 5–6 mm long 14. *I. glandulosa*
 b. Stipules c. 1 mm long; glands on leaflets dark orange; biramous hairs with equally long arms; ovary 3–6-ovuled, glabrous; pod linear with thickened margins, 11–15 mm long 34a. *I. trifoliata* subsp. *trifoliata*
- 14 a. Plant with spreading gland-tipped hairs (magn. $\times 30$) 8. *I. colutea*
 b. Plant without gland-tipped hairs 15
- 15 a. Lower surface of leaflets with more or less spreading biramous hairs with unequally long arms (most distinct on midrib) 16
 b. Lower surface of leaflets with adpressed biramous hairs with equally long arms
 21
- 16 a. Leaflets 25–49, subopposite, sometimes a few alternate 11. *I. dosua*
 b. Leaflets 5–17, all opposite 17

- 17 a. Leaflets glabrous above 38. *I. caudata*
 b. Leaflets hairy above 18
- 18 a. Upper surface of leaflets with adpressed biramous hairs with equally long arms 26. *I. parkesii*
 b. Upper surface of leaflets with spreading biramous hairs with unequally long arms 19
- 19 a. Stipules 4–6 mm long; stipellae absent; racemes with 1–4 flowers; pods spreading, glabrous 13. *I. glabra*
 b. Stipules 7–12 mm long; stipellae present; racemes many-flowered; pods descending, hairy 20
- 20 a. Leaflets 3–9; stipules 10–12 mm long; flowers 6 mm long; calyx teeth narrowly triangular; anthers without hairs; lateral pocket 0.7 mm long, reflexed; ovules 6–9 15. *I. hirsuta*
 b. Leaflets 7–17; stipules 7–8 mm long; flowers 11 mm long; calyx teeth deltoid; anthers with a basal and apical tuft of hairs; lateral pocket short, perpendicular; ovules 12–13 1. *I. aralensis*
- 21 a. All leaflets alternate 22
 b. All leaflets opposite or subopposite, sometimes a few alternating 25
- 22 a. Racemes 0.5–2.5 cm long; ovules 1–3, pod globose, 3–8 mm long 20. *I. linnaei*
 b. Racemes (1.5–)2.5–17 cm long; ovules 7–10; pod elongate or slightly curved, 10–35 mm long 23
- 23 a. Dried plant with greyish appearance; stipules 3–5 mm long; stipellae absent; calyx teeth 0.7–1 mm long; ovary hairy, pods slightly curved, constricted between the seeds, 10–20 mm long; endocarp blotched 25. *I. oblongifolia*
 b. Dried plant with greenish appearance; stipules 5–6 mm long; stipellae present; calyx teeth 2.5–3 mm long; ovary glabrous; pods straight, somewhat quadrangular in cross-section, 20–35 mm long; endocarp not blotched (*I. spicata*) 24
- 24 a. Leaflets obovate to narrowly obovate, upper surface always hairy 30a. *I. spicata* var. *spicata*
 b. Leaflets linear, upper surface hairy or glabrous 30b. *I. spicata* var. *siamensis*
- 25 a. All pods distinctly curved upwards 32a. *I. suffruticosa* subsp. *suffruticosa*
 b. Pods straight or only a few slightly curved, or pods absent 26
- 26 a. Back of standard glabrous, only the margin ciliate 27
 b. Back of standard hairy 28
- 27 a. Leaflets 12–27 mm long; racemes 4–10 cm long, usually with sterile bracts in the basal part; bracts 2–4 mm wide, enclosing the buds; flowers 10–20 mm long; calyx teeth longer than broad; connective with a basal tuft of hairs; ovules 9–13; endocarp blotched 7. *I. cassioides*
 b. Leaflets 30–45 mm long; racemes 13–22 cm long, without sterile bracts at the base; bracts 1–1.5 mm wide, not enclosing the buds; flowers 8 mm long; calyx teeth as long as broad; connective without tufts of hairs; ovules 6–8; endocarp not blotched 3. *I. atropurpurea*

28 a. Upper surface of leaflets with biramous hairs all with unequally long arms 35b. *I. trita* subsp. *scabra*

b. Upper surface of leaflets with most biramous hairs with equally long arms 29

29 a. Racemes 1.5 to 2.5 times as long as the corresponding leaf 30

b. Racemes as long as or shorter than the corresponding leaf 33

30 a. Upper surface of leaflets glabrous or with very few hairs, lower surface conspicuously veined; ovules 19–20; pod uncinata 4. *I. bella*

b. Upper surface of leaflets hairy, lower surface not conspicuously veined; ovules 4–14; pod not uncinata 31

31 a. Stipules 5–10 mm long; pods 20–45 mm long 32

b. Stipules 2–3 mm long; pods 55–60 mm long 18. *I. laxiflora*

32 a. Flowers 5–6 mm long; bracts 3–4 mm long; pedicels 1–1.5 mm long; ovules 4–6; pods 20–25 mm long, spreading to descending 23. *I. nigrescens*

b. Flowers 8–10 mm long; bracts c. 1 mm long; pedicels 2.5–4 mm long; ovules 6–10; pods 35–45 mm long, ascending 17. *I. lacei*

33 a. Flowers c. 3 mm long; ovules 1–4; pods 4–10 mm long, stipitate 32b. *I. suffruticosa* subsp. *guatemalensis*

b. Flowers 4–16 mm long; ovules 4–20; pods 15–70 mm long, not stipitate 34

34 a. Seeds 90 degrees turned in the basal-apical plane, arranged like a pile of coins 35

b. Seeds differently arranged 36

35 a. Flowers 8–10 mm long; lateral pocket 2 mm long, ovules 14–15; pods somewhat flattened, dehiscent, ascending 21. *I. luzonensis*

b. Flowers 4.5–6.5 mm long; lateral pocket 0.5 mm long; ovules 18; pods inflated, round in cross-section, indehiscent, spreading 37. *I. zollingeriana*

36 a. Leaflets 21–41 37

b. Leaflets 7–19 38

37 a. Leaflets in basal part of rachis alternating, opposite in apical part; 18–28 by 7–9 mm, stipules 7–10 mm long; bracts 4 mm long, exceeding the buds, flowers c. 10 mm long; calyx teeth deltoid, connective with a basal and apical tuft of hairs; pods c. 45 mm long 29a. *I. sootepensis* subsp. *sootepensis*

b. All leaflets opposite; 3–10 by 2–5 mm; stipules 1–2 mm long; bracts c. 1 mm long, not exceeding the buds; flowers 4–6 mm long; calyx teeth triangular; connective without hairs; pods 20–30 mm long 36. *I. wightii*

38 a. Ovules 16–20; pods 50–70 mm long 39

b. Ovules 4–13; pods 15–40 mm long 41

39 a. Flowers 5–7 mm long; leaflets 7–15 mm broad; nerves not visible; pods ascending 12. *I. galeoides*

b. Flowers 10–15 mm long; leaflets 15–45 mm broad; nerves distinct; pods spreading or slightly descending 40

40 a. Leaflets glabrous above; ovules 19 or 20; pod uncinata 4. *I. bella*

b. Leaflets thinly hairy above, glabrescent; ovules 16, pod not uncinata 39. *Sp. A*

41 a. Leaflets distinctly reticulately veined 27. *I. reticulata*

b. Leaflets with very indistinct veins 42

- 42 a. Flowers 8–16 mm long; connective with at least a basal tuft of hairs 43
 b. Flowers 4–6 mm long; connective without hair tufts 45
 43 a. Leaves 15–19; ovules 13 29b. *I. sootepensis* subsp. *acutifolia*
 b. Leaves 7–11; ovules 8–10 44
 44 a. Leaflets elliptic to obovate, 5–11 by 2.5–6 mm; flowers 8 mm long; calyx
 teeth 2–2.5 mm long 28. *I. emmae*
 b. Leaflets narrowly ovate, 15–28 by 8–14 mm; flowers 12–16 mm long; calyx
 teeth 1–1.5 mm long 10. *I. decora*
 45 a. Ovules 4–6(–7); pods all distinctly curved
 32a. *I. suffruticosa* subsp. *suffruticosa*
 b. Ovules 6–12; pods straight or some slightly curved 46
 46 a. Stipules 3–6 mm long 2. *I. arrecta*
 b. Stipules 1.5–2 mm long 47
 47 a. Leaflets glabrous or with very few hairs above; pods descending 33. *I. tinctoria*
 b. Leaflets hairy above; pods spreading 16. *I. kerrii*

1. *Indigofera aralensis* Gagnep.

I. aralensis Gagnep. in Lecomte, Not. Syst. 3 (1914) 197; Fl. Gén. I-C. 2 (1916) 436. – Type: *Pierre 998* (K, L, P, SING), Cambodia, Samrong Tong, Mt Aral.

Shrub, 1–3 m high; branches erect, not striate. Biramous hairs more or less spreading, with unequally to about equally long arms, the shorter arm about half the length of the longer one. Stipules narrowly triangular, 8–9 by 1 mm. Rachis 7–10 cm long, ultrajugal part 3–4 mm long; stipellae linear, 1.5 mm long, caducous. Petioles 1 mm long. *Leaflets* 13–27, opposite, elliptic to obovate, 10–14 by 5–7 mm, apex obtuse to rounded, mucro 0.5–1 mm long, base obtuse; nerves not visible. *Racemes* 3.5–5 cm long; bracts narrowly triangular, 5–9 by 1 mm, exceeding the buds. Pedicels 2 mm long. *Flowers* 11 mm long; cup of calyx 2 by 2.5 mm, teeth deltoid, 0.5–1 by 1 mm; standard elliptic, 11 by 5 mm, with hairs on the back; wings glabrous, 7.5 mm long; keel 10 mm long, with hairs on the outside and short-ciliate margins, lateral pocket absent; staminal tube 9 mm long; anthers 1 by 0.4 mm, with hairs at apex and base; ovary glabrous; ovules 12 or 13. Pod unknown.

Distribution. Cambodia.

Note. Only known from the type.

2. *Indigofera arrecta* Hochst. ex A. Rich.

I. arrecta Hochst. ex A. Rich., Tent. Fl. Abyss. 1 (1847) 184; Gillett in Hutch. e.a., Fl. W. Trop. Afr. 1, 2 (1958) 541; Kew Bull., Add. Ser. 1 (1958) 105; Backer & Bakh. f., Fl. Java 1 (1964) 592; Gillett e.a., Fl. Trop. E. Afr., Legum. 3, Pap. 1 (1971) 307. – Types: *Schimper 349* (K), Ethiopia, Mt Scholob; *Schimper 1923* (K, L), Ethiopia, Adoam.

I. cryptantha Benth. ex Harv., Fl. Cap. 2 (1862) 195. – Type: *Sutherland s.n.* (K), South Africa, Natal.

I. umbonata Welw. ex Baker, Fl. Trop. Afr. 2 (1871) 98. – Type: *Welwitsch 2083* (BM), Angola.

I. scopia De Wild. & Th. Dur., Ann. Mus. Congo Bot. Ser. III, 1 (1901) 60. - Type: *De Wevre 1027* (BR, photo seen at K), Zaire.

Shrub, 0.75–3 m high; branches erect, striate. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 3–6 by 0.5–1 mm. Rachis 5–10 cm long, ultrajugal part 0.3–0.6 mm long; stipellae linear, 0.8–1 mm long. Petiolules 1.5–2 mm long. *Leaflets* (9–)11–17(–19), opposite, elliptic to narrowly elliptic, 12–27 by 5–9 mm, base acute to obtuse, apex obtuse to rounded, mucro 0.1–0.4 mm long, upper surface of leaflets sometimes with very few hairs; nerves not distinct. *Racemes* 3–8 cm long; bracts narrowly triangular, 1–2 by 0.2 mm, caducous. Pedicels 1 mm long. *Flowers* 4.5–6 mm long; calyx cup 1 by 1–2 mm, teeth triangular, 0.7–1 by 0.3–0.7 mm; standard elliptic to ovate, 4–5.5 by 2.5–4 mm, hairy on the back; wings 3–4.5 by 1–1.5 mm, almost glabrous; keel 4.5–5.5 by 2 mm, hairy, especially at the apex and margins short-ciliate, lateral pocket 1 by 0.5 mm; staminal tube 3–4 mm long; anthers 0.5–1 by 0.4–0.5 mm; ovary with few hairs along upper margin; ovules 6–8. *Pod* straight, descending, round in cross-section, apex round, dehiscent, 20–26 by 2.5–3 mm, almost glabrous; endocarp blotched. *Seeds* 6–8, 3 by 2 mm, brown.

Field notes. Standard yellow-green with red veins; wings light red; keel yellow-green.

Distribution. Tropical, subtropical and South Africa, Arabia. Introduced in Laos, Vietnam, Luzon, Sumatra, Java, Sumba, Flores.

Habitat. Waste places; riverbanks and sunny roadsides; not seldom escaped. Altitude 0–1400 m.

Vernacular names. Natal-indigo (English, Dutch), taem, téllèp (Sumatra), ta-roem daoen aloesj, tom, tom atal, tom katémas (Java).

Notes. 1. Native of Ethiopia, introduced in Java between 1860 and 1865 from Natal. Introduced from Java in India and called there 'Java-indigo'.

2. The range is greatly extended through cultivation. It seems that hybridization occurs between *I. arrecta* and *I. tinctoria*. In West Africa especially plants occur that might be assigned to either species. In East Africa the two species mostly grow separate because *I. arrecta* occurs mainly at higher altitudes (Gillett, 1958).

3. *Indigofera atropurpurea* Buch.-Ham. ex Horn.

I. atropurpurea Buch.-Ham. ex Horn., Hort. Hafn. Suppl. (1819) 152; Miq., Fl. Ind. Bat. 1, 1 (1855) 311; Ali, Bot. Notis. 3 (1958) 571; Fl. W. Pak. 100 (1977) 84. - Type: *Hornemann s.n.* (C, n.v.), cultivated in the Hortus at Copenhagen.

I. atropurpurea Buch.-Ham. ex Roxb., Hort. Beng. (1814) 57, nom. nud.; Fl. Ind. 3 (1832) 381. - Type: cultivated in Calcutta (n.v.).

Shrub, branches erect. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 5 by 0.6 mm. Rachis 12–20 cm long, ultrajugal part 2–11 mm long; stipellae linear, 1–1.5 mm long. Petiolules 2–3 mm long. *Leaflets* 11–17, opposite, elliptic, 30–80 by 15–30 mm, base obtuse to rounded, apex acute to rounded, sometimes retuse, mucro 1–1.5 mm long; nerves 9–11 alternating pairs, inter-

secondary venation reticulate. *Racemes* 13–42 cm long; bracts narrowly triangular, 4–6 by 1–1.5 mm. Pedicels 1.5 mm long. *Flowers* 8–10 mm long; calyx cup 1.5 by 2 mm, teeth deltoid, 1 by 1–1.5 mm; standard elliptic, 9 by 6 mm, glabrous; wings 8 by 2–2.5 mm, glabrous, but short-ciliate along margins; keel 8 by 2.5 mm, glabrous, but ciliate along upper margin, lateral pocket 1–1.2 by 0.5 mm; staminal tube 7 mm long; anthers 0.5 by 0.5 mm; ovary glabrous; ovules 9–11. *Pod* straight, more or less spreading to descending, round in cross-section, dehiscent, 35–45 by 4 mm, glabrous, endocarp not blotched. *Seeds* 6–8, spherical in cross section, 2.5 by 2.5 mm, smooth, black.

Distribution. Kashmir, N. Punjab, Kumaun, Nepal, Bangladesh, E. Himalayas, Sri Lanka, Yunnan, Kwangsi, Kwantung, Kouy-Tchèou, Burma, Vietnam.

Habitat. Altitude 300–2300 m.

Note. The name *I. atropurpurea* first appeared in 1814, when Roxburgh published this name without description in his *Hortus Bengalensis*. It was validated by Hornemann (1819), who described it from a plant from the *Hortus* of Copenhagen. In 1932 Roxburgh also published *I. atropurpurea* in his *Flora Indica*, apparently unaware of the validation by Hornemann. Roxburgh noted that the plant was cultivated in the *Hortus* of Calcutta, introduced by Dr. Buchanan from Nepal. He also made a mysterious note that the same plant has been reared from American seeds sent without a name from Philadelphia by William Hamilton. The latter was a ‘plant introducer’ who was probably misled by wrongly labelled seed samples (Mabberley, pers. comm.).

4. *Indigofera bella* Prain

I. bella Prain, J. As. Soc. Beng. 66, ii (1897) 355; Ann. Bot. Gard. Calc. 10 (1901) t. 28. – *Types:* *Prager s.n.* (K), Upper Burma, Myingin Hills; *Prager s.n.* (CAL, K), Kalay Hills; *Kurz s.n.* (n.v.), Pegu.

Shrub, 2.5–3.5 m high; branches erect, slightly 4-angled. Biramous hairs adpressed with equally long arms, 0.3 mm long. Stipules linear, 2–2.5 mm long. Rachis 13–15 cm long, ultrajugal part 9–13 mm long; stipellae linear, 2 mm long, persistent. Petioles 2–4 mm long. *Leaflets* 7–9, opposite, elliptic, 3–7.5 by 1.5–4.5 cm, base obtuse, apex acute to obtuse, mucro 0.2 mm long, upper surface of leaflets glabrous or with very few hairs; nerves conspicuous, c. 10 alternating pairs. *Racemes* 10–24 cm long; bracts caducous, n.v. Pedicels 1 mm long. *Flowers* 15 mm long; calyx cup 1.5 by 3 mm, teeth deltoid, 1 by 2 mm; standard elliptic, 13 by 8 mm, hairy on the back; wings 11.5 by 3 mm, glabrous; keel 13 by 4.5 mm, glabrous, but margins short-ciliate, lateral pocket 1 mm long; staminal tube 13 mm long; anthers 1.2 by 0.5 mm; ovary glabrous; ovules 19 or 20. *Pods* straight, spreading or descending, apex abruptly recurved, round in cross-section, dehiscent, 5.5–7 mm by 0.4 cm, glabrous; endocarp blotched.

Distribution. Burma.

5. *Indigofera brunoniana* Grah.

I. brunoniana Grah., Pl. As. Rar. 3 (1832) 48, t. 279; Larsen, Bol. Soc. Port. 12, 2a (1968-69) 217. - Type: Wallich 5491 (K).

Shrub; branches erect. Biramous hairs adpressed with equally long arms. Stipules early caducous. Rachis 2.5-8 cm long; stipellae 1.5-2.5 mm long. Petiolules 2-4 mm long. *Leaflets* 1(-3), opposite, elliptic to oblong, 7-14 by 3.5-9 cm, base obtuse to rounded, apex acute to obtuse, mucro 2 mm long; nerves 12-23 alternating pairs. *Racemes* 6-20 cm long; bracts narrowly triangular, 2-3 mm long, persistent. Pedicels 1-2 mm long. *Flowers* 10 mm long; calyx cup 1.5 by 2.5 mm, teeth deltoid, 1 by 1.5 mm; standard elliptic, 11 by 8 mm, hairy on the back; wings 6 by 1.5 mm, glabrous, but short-ciliate along margins; keel 9 by 3 mm, with hairs at the apex and ciliate along the margins, lateral pocket 1 mm long; staminal tube 9 mm long; anthers 1 by 0.5 mm; ovary with few hairs; ovules 10. *Pod* straight, spreading round in cross-section, apex abruptly recurved, 40-45 by 4 mm, hairy; endocarp blotched. *Seeds* 8, dark brown.

Distribution. Burma.

Habitat. Altitude 1050 m.

6. *Indigofera caloneura* Kurz - Fig. 3.

I. caloneura Kurz, J. As. Soc. Beng. 42 (1873) 229; Baker in Hook. f., Fl. Br. India 2 (1876) 93; Larsen, Bol. Soc. Port. 12, 2a (1968-69) 220. - Type: Kurz s.n. (prob. CAL, n.v.).

I. oblonga Craib, Kew Bull. (1914) 6; Kew Bull. (1922) 237, descr. ampl.; Gagnep., Fl. Gén. I.-C. 2 (1916) 440; Craib, Fl. Siam. Enum. 1 (1928) 379; Larsen, Bol. Soc. Port. 12, 2a (1968-69) 217. - Type: Kerr 2524 (BM, E, K), Thailand, Doi Nang Keo.

Shrub, 1-2 m high; branches erect. Biramous hairs more or less spreading with unequally long arms. Stipules narrowly triangular, 3.5-5 by 1 mm. Rachis 8-20 mm long, pulvinate; stipellae narrowly triangular, 1-3 by 1 mm. Petiolules 3-5 mm long. *Leaflets* elliptic to oblong, 5-20 by 2.5-12 cm, base and apex acute to rounded, mucro 1.5 mm long, upper surface of leaves glabrous; nerves conspicuous, c. 20 alternating pairs; venation reticulate. *Racemes* 8-15 cm long; bracts narrowly triangular, 2 by 0.5 mm. Pedicels 1-5 mm long. *Flowers* 6-8 mm long; calyx cup 2 by 2 mm, teeth deltoid, 0.5 by 0.5 mm; standard orbicular, 6-8 by 6-7 mm, hairy on the back; wings 5-7 by 2.5-3 mm, hairy outside and margins ciliate; keel 6.5-8 mm, hairy outside and margins ciliate, lateral pocket 1 mm long; staminal tube 7.5 mm long, anthers 0.7 by 0.5 mm, with hairs at the base; ovary sparsely strigose; ovules 11. *Pod* straight, spreading, round in cross-section, apex abruptly recurved, 14-50 by 3-4 mm, with few hairs; endocarp blotched. *Seeds* 9-11, quadrangular in cross-section, 2 by 2 mm, pitted, dark brown.

Field notes. Flowers whitish, yellowish brown or orange-yellow.

Distribution. Burma, Thailand, Laos, Vietnam.

Habitat. Mixed deciduous forest; disturbed dry dipterocarp forest; open evergreen forest. Altitude 700-2000 m.

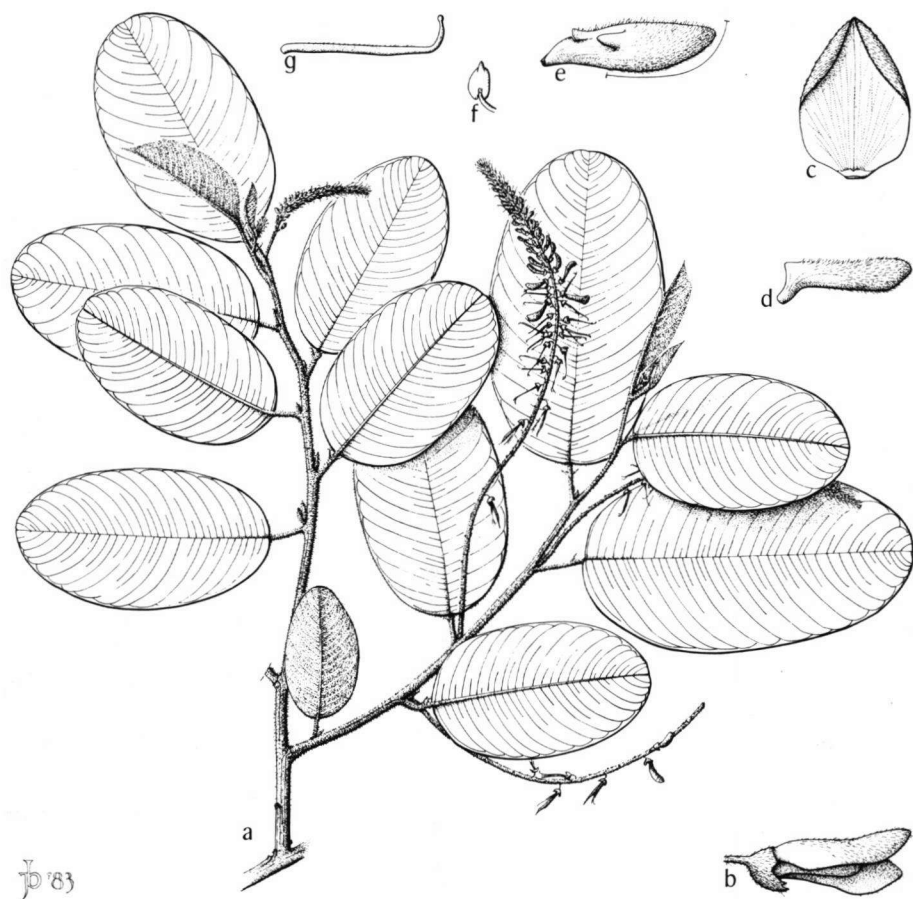


Fig. 3. *Indigofera caloneura* Kurz. a. Habit, $\times 0.5$; b. flower, $\times 2.5$; c. standard inside, $\times 2.5$; d. wing petal, $\times 2.5$; e. keel petal, curved line indicates connate part, $\times 2.5$; anther, $\times 5$; g. ovary, $\times 2.5$ (Vidal et al. 6281, L).

7. *Indigofera cassioides* Rottler ex DC.

I. cassioides Rottler ex DC., Prod. 2 (1825) 225; Ali, Bot. Notis. 3 (1958) 569; Fl. W. Pak. 100 (1977) 83. — Type: *Leschenault 31* (G-DC, holo, seen on microfiche; P, iso), India, Nilgiry Hills.

I. leptostachya DC., Prod. 2 (1825) 225; Miq., Fl. Ind. Bat. 1, 1 (1855) 310. — Type: Herb. De Candolle II-225-35 (G-DC, microfiche L).

I. violacea Roxb., Hort. Beng. (1814) 57; Fl. Ind. 3 (1832) 380. — Type: plant in Botanical Garden at Calcutta.

- I. elliptica* Roxb., Hort. Beng. (1814) 57; Fl. Ind. 3 (1832) 380; Craib, Fl. Siam. Enum. 1 (1928) 377. — Type: ? Ic. Roxb. (ined. K).
I. arborea Roxb., Hort. Beng. (1814) 57; Fl. Ind. 3 (1832) 381. — Type: Ic. Roxb. ined. 1626 (K).
I. pulchella Roxb., Hort. Beng. (1814) 57; Fl. Ind. 3 (1832) 382; Miq., Fl. Ind. Bat. 1, 1 (1855) 311; Gagnep., Fl. Gén. I-C. 2 (1916) 430; Craib, Fl. Siam. Enum. 1 (1928) 380; Ali, Bot. Notis. 3 (1958) 570. — Type: Ic. Roxb. ined. 389 (K).
I. purpurascens Roxb., Hort. Beng. (1814) 57; Fl. Ind. 3 (1832) 383. — Type: Ic. Roxb. ined. 1899 (K).
I. gibsoni J. Grah., Cat. Bomb. Pl. (1839) 46. — Type: Gibson s.n. (n.v.), Bombay Hills near Hewra.

Shrub, 60–200 cm high; branches erect, striate. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 2–5 by 0.4–1 mm, caducous. Rachis 7–20 cm long, ultrajugal part 0.5–0.7 cm long; stipellae linear, 1 mm long. Petiolules 1–2 mm long. *Leaflets* (9–)11–23(–27), opposite, subopposite or sometimes a few alternate, elliptic to obovate, 12–27 by 7–20 mm, base obtuse, apex obtuse to emarginate, mucro 0.2–1 mm long; nerves prominent below, c. 11 alternating pairs; venation reticulate. *Racemes* 4–10 cm long, often with empty bracts at the base; bracts boat-shaped, enclosing the flowerbuds, 4–10 by 2–4 mm, caducous. Pedicels c. 1 mm long. *Flowers* 10–20 mm long; calyx cup 1.5–3 by 2.5–3 mm, teeth triangular, 1–3 by 0.7–1.5 mm; standard ovate, 11–17 by 6.5–10 mm, glabrous, margin minutely hairy; wings 7–12 by 2–3 mm, glabrous, ciliate along the margins, keel 8–14 by 2–3 mm, glabrous, ciliate along margin, especially the apex, lateral pocket 2 mm long; staminal tube 7–13 mm long; anthers 1 by 1 mm, with a tuft of hairs at top and base; ovary glabrous, ovules 9–13. *Pod* straight, spreading to descending, round in cross-section, dehiscent, 30–45 mm long and beaked, glabrous; beak 2 mm long; endocarp blotched. *Seeds* 2 by 1 mm, oval, dark brown, smooth.

Field notes. Flowers pinkish purple.

Distribution. Pakistan, Punjab; Kashmir; India, Kumaun, N. Punjab and throughout the hills of N. India; Bhutan; Burma; China, Yunnan, Thailand.

Habitat. Open savanna, mixed deciduous forest, disturbed dry dipterocarp forest. Altitude 100–1200 m.

Vernacular names. Dok kham (Me Kong), kham-nam, sa kham (Laos), kled-daeng (Thailand).

Note. After having studied the holotypes of *I. cassioides* and *I. leptostachya* in the Geneva Herbarium and the holotypes of the respective Roxburgh species, Ali (1958) concluded that all these plants fall into two groups, viz. those with sterile bracts at the base of the racemes and those without sterile bracts. To the former group belong, according to Ali, *I. leptostachya*, *I. cassioides*, *I. violacea* and *I. elliptica*, to the latter group belong *I. pulchella* and *I. purpurascens*. There is indeed no sign of sterile bracts in the plate of *I. pulchella*, but two of the four racemes on the plate of *I. purpurascens* have sterile bracts. This is also the case in the drawing of *I. elliptica*. We consider these taxa to be conspecific, because besides this doubtful character no others were found.

8. *Indigofera colutea* (Burm. f.) Merr.

- I. colutea* (Burm. f.) Merr., Philip. J. Sc. 19 (1921) 355; Ali, Bot. Notis. 3 (1958) 548; Gillett, Kew Bull., Add. Ser. 1 (1958) 65; in Hutch. e.a., Fl. W. Trop. Afr. 1, 2 (1958) 540; Backer & Bakh. f., Fl. Java 1 (1964) 590; Gillett, Kew Bull. 24 (1970) 484; Gillett e.a., Fl. Trop. E. Afr., Legum. 3, Pap. 1 (1971) 266; Verdc., Man. New Guinea Legum. (1979) 351. — *Galega colutea* Burm. f., Fl. Ind. (1768) 172. — *I. viscosa* Lamk., Encycl. 3 (1789) 249; Decne., Herb. Timor Descr. (1835) 141; Miq., Fl. Ind. Bat. 1, 1 (1855) 314; Baker f., Legum. Trop. Afr. (1926) 123. — *Tephrosia colutea* (Burm. f.) Pers., Syn. 2 (1807) 329, pro type. — Type: Hb. Sloane vol. 95, fol. 185 (BM), India. [Pluk. Phyt. (1691) t. 166, f. 3.]
- I. graveolens* Schrader, Sert. Hannov. (1796) 20. — Type: Plate 12, Schrader l.c.
- I. lateritia* Willd., Sp. Pl. 3 (1803) 1233. — Type: Herb. Willdenow (B, n.v.; L microfiche), Guinea.
- I. glutinosa* Perrier ex DC., Prod. 2 (1825) 227. — Type: *Perrotet 182* (BM, P), Senegal.
- I. consanguinea* Klotzsch in Peters, Reise Mossamb. Bot. (1861) 50. — Type: *Peters s.n.* (B, lost), Mozambique, Quelimane.
- I. seticulosa* Harv., Fl. Cap. 2 (1862) 196. — Type: *Armstrong 385* (K), Australia.
- I. zenkeri* Harms ex Baker f., J. Bot. 41 (1903) 241; Gillett, Kew Bull. 24 (1970) 486. — Type: *Zenker 1456* (BM, K, L), Cameroon, Sanage & Na Tinatti.
- I. viscosa* Lamk. var. *somalensis* Baker f., J. Bot. 41 (1903) 242; Baker f., Legum. Trop. Afr. (1926) 124. — *I. colutea* (Burm. f.) Merr. var. *somalensis* (Baker f.) Cuf., Bull. Jard. Bot. Etat Brux. 25 (1955) 263. — Type: *Donaldson-Smith s.n.*, 30-vi-1894 (BM), Somaliland, Milmil.
- I. viscosa* Lamk. var. *dembianensis* Chiov., Ann. de Bot. 9 (1911) 58; Baker f., Legum. Trop. Afr. (1926) 124. — *I. colutea* (Burm. f.) Merr. var. *dembianensis* (Chiov.) Cuf., Bull. Jard. Bot. Etat Brux. 25 (1955) 263. — *I. dembianensis* (Chiov.) Gillett, Kew Bull. 24 (1970) 488. — Types: *Chiovenda 1229, 1328, 1670, 2278, 2391* (FI), Ethiopia, Dembia.
- I. zenkeri* Harms ex Baker f. var. *brevifoliolata* De Wild., Bull. Jard. Bot. Etat Brux. 8 (1923) 185; Baker f., Legum. Trop. Afr. (1926) 127. — Type: *Bequart 3371* (BR, K photo), Zaïre.
- I. junodii* N.E. Brown, Kew Bull. (1925) 147. — Type: *Junod 645* (K), Transvaal, Pietersburg Dist., Shilouvane.
- I. viscosa* Lamk. var. *brachyptera* Baker f., Legum. Trop. Afr. (1926) 124. — Type: *Gossweiler 400* (K), Angola.
- I. colutea* (Burm. f.) Merr. var. *linearis* Baker f. ex Gillett, Kew Bull., Add. Ser. 1 (1958) 65. — *I. brachynema* Gillett, Kew Bull. 24 (1970) 487. — Type: *Eyles 4483* (BM), Zimbabwe, Salisbury Dist.
- I. colutea* (Burm. f.) Merr. var. *grandiflora* Gillett, Kew Bull., Add. Ser. 1 (1958) 66. — *I. masaiensis* Gillett, Kew Bull. 24 (1970) 488. — Type: *Bogdan 1869* (K), Kenya, Lake Elmenteita.

Shrublet, 10–70 cm high. Biramous hairs more or less adpressed with equally long arms, mixed with spreading, caducous, gland-tipped hairs. Stipules narrowly triangular, 2–4 mm long. Rachis 7–35 mm long, ultrajugal part 1.5–4 mm long, stipellae absent. Petiolules c. 0.5 mm long. *Leaflets* (3–)5–13, opposite, elliptic to obovate, 4–12 by 2–5 mm, base obtuse to rounded, apex rounded, mucro 0.2 mm long, biramous hairs on upper surface more or less spreading, 0.4–0.6 mm long, adpressed on lower surface and 1–1.5 mm long, margins sometimes with gland-tipped hairs. *Racemes* 1–4 cm long; bracts narrowly triangular, c. 1 mm long. Pedicels 0.5–1 mm long. *Flowers* 4 mm long; calyx cup 1 by 1 mm; teeth narrowly triangular, 1 mm long; standard obovate, hairy on the back, 3.5–4.5 by 3 mm; wings 3.5–4 by 1–1.5 mm, glabrous; keel petals 3.5–4 by 1–1.5 mm, mainly glabrous outside, hairy near

lower margin, and margins short-ciliate; lateral pocket 0.5–1 mm long; staminal tube 3 mm long, anthers 0.2 by 0.2 mm; ovary sparsely strigose; ovules 8–11. *Pod* straight, spreading, rounded in cross-section, 12–15 by 1.5 mm, beaked, with biramous hairs and spreading gland-tipped hairs; endocarp blotched. *Seeds* 7–9, quadrangular, flat in cross-section, 1.2 by 1 mm, brown.

Field notes. Standard pale pinky green outside, inside red, wings red, keel pale green on back, upper surface red.

Distribution. Tropical and South Africa, Arabia to India, Sri Lanka, Burma, Thailand, Vietnam, Celebes, Java, Madura, Kangean Arch., Bali, Sumba, Flores, Alor, Timor, Tanimbar I., New Guinea, Northern Territory of Australia, Queensland, South Australia, New Zealand.

Habitat. Grassfields, riverdikes, light forests, seashore dunes, fallow agricultural fields; eucalypt savanna, open spot in dry deciduous forest. Altitude 0–750 m.

Vernacular names. Bunga merah, kamala nara, long long (Alor), totowaän (Madura).

Notes. 1. The complicated synonymy of *Tephrosia colutea* (Burm. f.) Pers. is discussed by M.T.M. Bosman & A.J.P. de Haas in a note under *Tephrosia villosa* (L.) Pers. in *Blumea* 28 (1983) 478, note 2.

2. Gillett (1970) distinguished *I. zenkeri* from *I. colutea* mainly on the length of the glandular hairs and the length and shape of the style. We found a continuous range, which, however, does not exclude the existence of local (or regional) variants.

9. *Indigofera cordifolia* Heyne ex Roth

I. cordifolia Heyne ex Roth, Nov. Pl. Sp. (1821) 357; Decne., Herb. Timor. Descr. (1835) 140; Miq., Fl. Ind. Bat. 1, 1 (1855) 316; Benth., Fl. Austr. 2 (1864) 196; Baker in Hook. f., Fl. Br. India 2 (1876) 93; Baker f., Legum. Trop. Afr. (1926) 102; Ali, Bot. Notis. 3 (1958) 545; Gillett, Kew Bull., Add. Ser. 1 (1958) 35; in Hutch. e.a., Fl. W. Trop. Afr. 1, 2 (1958) 539; Backer & Bakh. f., Fl. Java 1 (1964) 590. — **Type:** *Heyne s.n.* (L), Ind. Or.

Herb, 10–30 cm high; branches ascending. Biramous hairs adpressed to slightly spreading with sometimes very unequally long arms. Stipules narrowly triangular, 2 by 0.5 mm, apex cuspidate. Petioles not pulvinate, 1 mm long. *Leaf blade* cordate, 3.5–4 by 4 mm, apex acuminate; nerves not visible. *Racemes* 2–3 mm long, with 1–4 flowers; bracts narrowly triangular, 2 by 0.5 mm, apex cuspidate. Pedicels 0.5 mm long. *Flowers* 3 mm long; calyx cup 1 by 0.7 mm, teeth narrowly triangular, 1.5 mm long; standard spatulate, hairy on the back, 2.5–3 by 1–1.5 mm; wings 2.5 by 0.4 mm, glabrous; keel 2.5 by 0.5 mm, glabrous, except for the dorsal auricle, lateral pocket 0.25 mm long; staminal tube 2 mm long, anthers 0.2 by 0.25 mm; ovary with hairs; 1 or 2 ovules. *Pod* subglobose, 2 by 1.5 mm, hairy; endocarp blotched. *Seeds* 1 or 2, red brown.

Distribution. Tropical Africa to India, Java (Leiden Islet), Sumba, Sawu, Roti, Timor, N. Australia.

Habitat. Beaches, *Pandanus*-vegetation, grassfields. Altitude 0–150 m.

10. *Indigofera decora* Lindl.

I. decora Lindl., J. Hort. Soc. 1 (1846) 68. — Type: *Fortune s.n.* (K), China.

I. venulosa Champ. ex Benth. in Hook., J. Bot. 4 (1852) 44. — Type: *Champion s.n.* (K), Hong Kong, Victoria Peak.

Branches erect, glabrous. Biramous hairs adpressed with equally long arms. Stipules caducous. Rachis 5–6 cm long, ultrajugal part 5–6 mm long; stipellae 1.5–2 mm long, glabrous, persistent. Petiolules c. 2 mm long. *Leaflets* 9–11, opposite, narrowly ovate, 15–28 by 8–14 mm, base obtuse, apex acute to rounded, mucro c. 0.8 mm long, upper surface of leaflets glabrous; nerves not always distinct; venation reticulate. *Racemes* 5–6 cm long, rachis glabrous; bracts triangular to narrowly triangular, 1 mm long. Pedicels 2–2.5 mm long, glabrous. *Flowers* 12–16 mm long; calyx cup 1–1.5 by 2–2.5 mm, teeth triangular, 1–1.5 by 1 mm; standard 15 by 7 mm, tomentose on the back; wings 15 by 3 mm, glabrous, margins ciliate; keel petals 15 by 4.5 mm, glabrous, margins ciliate, lateral pocket 1 mm long; staminal tube 13 mm long, anthers 1 by 0.5 mm, with a tuft of hairs at top and base; ovary glabrous; ovules 8–10. *Pod* unknown.

Distribution. Hong Kong; Luzon (probably escaped from cultivation).

11. *Indigofera dosua* Buch.-Ham. ex D. Don

I. dosua Buch.-Ham. ex D. Don, Prod. Fl. Nepal. (Feb. 1825) 244; Baker in Hook. f., Fl. Br. India 2 (1876) 102; Gagnep., Fl. Gén. I.-C. 2 (1916) 435; Ali, Bot. Notis. 3 (1958) 562. — Type: *Buchanan-Hamilton s.n.* (BM), Suemba.

I. polyphylla DC., Prod. 2 (Nov. 1825) 227. — Type: *Wallich* in Herb. De Candolle (G-DC, L microfiche), Nepal.

I. virgata Roxb., Hort. Beng. (1809) 57; Fl. Ind. 3 (1832) 383. — Type: cult. in Hortus Botanicus Calcutta (K).

I. dosua Buch.-Ham. ex D. Don var. *tomentosa* Baker in Hook. f., Fl. Br. India 2 (1876) 102; Gagnep., Fl. Gén. I.-C. 2 (1916) 435. — *I. tomentosa* Grah. in Wall. Cat. 5487, nom. nud. — Type: *Wallich* 5487 (K).

I. stachyodes Lindl., Bot. Reg. (1843) t. 14. — Type: Plate 14 in Lindl. l.c.

Shrub, 50–250 cm high; branches erect, striate. Biramous hairs spreading with very unequally long arms. Stipules narrowly triangular, 8–9 by 1 mm; rachis 8–15 cm long; ultrajugal part c. 3 mm long; stipellae absent. Petiolules 0.5–1 mm long. *Leaflets* 25–49, opposite or sometimes a few alternating, narrowly elliptic, 5–19 by 2–6 mm, base rounded, apex acute to rounded, mucro 0.5 mm long; nerves visible; venation reticulate. *Racemes* 4–20 cm long; bracts narrowly triangular, 6–10 by 0.6 mm. Pedicels c. 1 mm long. *Flowers* 8–10 mm long; calyx cup c. 1 by 2 mm, teeth deltoid to triangular, 1–1.5 by 1 mm; standard elliptic, 10 by 6 mm, hairy on the back; wings 8 by 3 mm, glabrous, margins short-ciliate; keel 8–9 by 2.5–3 mm, hairy, especially at the top, margins short-ciliate, lateral pocket 1–1.5 mm long; staminal tube 7–8 mm long, anthers 1 by 0.5 mm; ovary almost glabrous, ovules 7–11. *Pod* straight, descending to spreading, 30–35 by 2.5–3 mm, with hairs;

endocarp not blotched. *Seeds* 7 or 8, round, laterally flattened, 2 by 2 mm, not pitted, dark brown.

Field notes. Flowers red-blue or violet-pink.

Distribution. India, Nepal, Bhutan, Assam, Burma, Thailand, Laos, Vietnam, Sumatra.

Habitat. Evergreen forest; open pine forest; secondary vegetations and grasslands. Altitude 800–2400 m.

Vernacular names. Koua di ma (Laos).

12. *Indigofera galegoides* DC.

I. galegoides DC., *Prod.* 2 (1825) 225; Miq., *Fl. Ind. Bat.* 1, 1 (1855) 310; *Suppl.* (1860) 114; Baker in Hook. f., *Fl. Br. India* 2 (1876) 100; Koord. & Valetton, *Bijdr.* 1 (1894) 269; Gagnep., *Fl. Gén. I.-C.* 2 (1916) 432; Merr., *Enum. Philip.* 2 (1923) 274; Backer & Bakh. f., *Fl. Java* 1 (1964) 592. – *Type:* *Leschenault s.n.* in Herb. De Candolle (G-DC, L microfiche), Sri Lanka.

I. finlaysoniana Grah. ex Ridley, *Fl. Mal. Pen.* 1 (1922) 581. – *Type:* *Wallich 5488* (K).

I. uncinata Roxb., *Hort. Beng.* (1809) 57; *Fl. Ind.* 3 (1832) 382; Craib, *Fl. Siam. Enum.* 1 (1928) 382. – *Type:* *lc. Roxb. ined. 2331* (K).

Shrub or small tree, 1–4 m high; branches erect, striate. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 3–4 by 0.5–1 mm; rachis 8–16 cm long, ultrajugal part c. 5 mm long. Petiolules c. 2 mm long. *Leaflets* 11–19, opposite, obovate, 20–40 by 7–15 mm, base cuneate, apex acute to rounded, mucro c. 1 mm long; nerves not distinct. *Racemes* 3–8 cm long; bracts narrowly triangular, c. 2 by 1 mm. Pedicels 2–2.5 mm long. *Flowers* 5–7 mm long; calyx cup 2 by 1.5 mm, teeth deltoid, 0.5–1 by 0.5–0.8 mm; standard elliptic, 5–7 by 4–6 mm, hairy on the back; wings 4–6 by 1.5 mm, glabrous, margins short-ciliate, keel 5–7 by 2–3 mm, mainly glabrous, apical part hairy and margins short-ciliate; lateral pocket c. 1 mm long, curved; staminal tube 5–6 mm long, anthers 1 by 0.7 mm; ovary glabrous; ovules 16. *Pod* straight, ascending, rounded in cross-section, beaked, 50–70 by 2.5 mm, almost glabrous, indehiscent; beak 5–10 mm long; endocarp blotched. *Seeds* 3 by 2 mm, dark brown.

Field notes. Standard greenish, wings pink; keel greenish yellow with brownish top.

Distribution. India, Sri Lanka, Burma, Thailand, Laos, Cambodia, Vietnam, Calamian I., Malaya, Sumatra, Kalimantan, Celebes, Java, Sumbawa, Wetar, Timor, Tanimbar I. Map 1 (p. 96).

Habitat. Brushwood, light forests, coconut plantations, roadsides and sometimes planted. Altitude 0–1000 m.

Vernacular names. Cha kran (Thailand), cham giai, kok pan, sa kham (Laos), mosmasoete, mososalasen (Tanimbar I.), entèng-entèng djamprah, ioedoesa, jatikarangan, marmaja, marmoyo, taroem oetan, tomtoman, tom wanang, wedoesang (Java), pulasan karbau (Sumatra), resag lati, taroem (Borneo).

13. *Indigofera glabra* L.

- I. glabra* L., Sp. Pl. (1753) 751; Baker f., J. Bot. 41 (1903) 242; Ali, Bot. Notis. 3 (1958) 573; Gillett, Kew Bull., Add. Ser. 1 (1958) 48, 56. — Type: Hermann vol. 3, fol. 27 (BM), Sri Lanka.
- I. pentaphylla* Murray, Syst. Veg. ed. 13 (1774) 564; Miq., Fl. Ind. Bat. 1, 1 (1855) 313; Baker in Hook. f., Fl. Br. India 2 (1876) 95; Gagnep., Fl. Gén. I.-C. 2 (1916) 440. — Type: *Linnaeus* 923-12 (LINN).
- I. fragrans* Retz., Obs. 4 (1786) 29. — Type: *König s.n.* (C?, LD?, n.v.).
- I. viscosa* Lamk. var. *subglabra* A. Rich., Tent. Fl. Abyss. 1 (1847) 182. — Types: *Quartin Dillon s.n.*, Abyssinia, Prov. Chire; *Schimper s.n.*, Abyssinia, Prov. Tighe (P?, n.v.).

Woody herb, c. 30 cm high, branches ascending. Biramous hairs spreading with very unequally long arms (nearly simple). Stipules narrowly triangular, 5–6 by 1 mm; rachis 2.5–8 mm long, ultrajugal part 1–2 mm long; stipellae absent. Petiolules c. 0.5 mm long. *Leaflets* (3–)5, opposite, elliptic to obovate, terminal leaflets 4–8 by 2.5–5 mm, lateral leaflets 2–5 by 1–3 mm, base obtuse to rounded, apex rounded; nerves not visible. *Racemes* 8–13 mm long, 1–4-flowered; bracts narrowly triangular to narrowly obovate with caudate apex, 2.5–3 by 1 mm. Pedicels c. 1 mm long. *Flowers* 2–3 mm long; calyx cup 0.8 by 1 mm; teeth narrowly triangular, 1–1.5 mm long; standard hairy on the back; wings almost glabrous; staminal tube 4 mm long; ovary glabrous; ovules 12. *Pods* straight, spreading, beaked, 18–22 by 1.5–2 mm, dehiscent, glabrous; endocarp blotched.

Distribution. India, Sri Lanka, Thailand, S. Vietnam.

Habitat. Open grassy grounds. Altitude low.

Note. Linnaeus described *I. glabra* in his Species Plantarum (1753). This species was placed by Miquel (1855) in the synonymy of *I. pentaphylla*, described by Murray in the 13th edition of Linnaeus' Systema Vegetabilum in 1774. Several authors followed Miquel until Baker f. (1903) discovered that *I. glabra* is older and had to be used.

14. *Indigofera glandulosa* Wendl.

- I. glandulosa* Wendl., Bot. Beob. (1798) 55. — Type: Herb. Wendland (Hannover, destroyed), but most probably a duplicate of the Roxburgh collection on which the following citation is based:
- I. glandulosa* Roxb. ex Willd., Sp. Pl. 3 (1803) 1227; Roxb., Fl. Ind. 3 (1832) 380; W. & A., Prod. (1834) 199; Benth., Fl. Austr. (1864) 196; Backer & Bakh. f., Fl. Java 1 (1964) 590. — Type: *Roxburgh s.n.* in Herb. J.E. Smith (LINN, L microfiche).
- Psoralea leichhardtii* F.v.Muell., Fragm. 4 (1863) 22. — Type: *Leichhardt s.n.* (MEL, n.v.), Australia, Comet River.
- I. glandulosa* Willd. var. *sykessii* Griff. in Baker in Hook. f., Fl. Br. India 2 (1876) 94. — Type: *Griffith s.n.* (K).

Shrublet, 10–75 cm high, branches erect. Biramous hairs more or less adpressed to slightly spreading with unequally long arms. Stipules narrowly triangular to linear, 3–4 by 0.2 mm; rachis 7–25 mm long, ultrajugal part 2–5 mm long; stipellae absent.

Petiolules 1–2 mm long; leaflets 3, opposite, obovate to narrowly obovate, the terminal leaflets 15–35 by 4–9 mm, the lateral leaflets 15–30 by 4–9 mm, base cuneate, apex rounded, mucro c. 0.5 mm long, surfaces hairy, lower surface with hyaline brown to black halfsunken disc-shaped glands; nerves alternating, 3–4 pairs. *Racemes* 2–12 mm long; bracts narrowly triangular, 1–2 mm long. Pedicels 0.5–1 mm long. *Flowers* 2.5–3.5 mm long; calyx cup 0.5–1 by 0.7–1.2 mm, teeth narrowly triangular, 1.5–2 by 0.5 mm; standard elliptic, 2.5–3.5 by 1–1.5 mm, hairy, with yellow brown latex glands on the back; wings 2.2–2.5 by 0.5–0.7 mm, glabrous; keel 2.7–3.2 by 1 mm, hairy, with brown glands, margin ciliate, lateral pocket 0.4 mm long; staminal tube 2–3 mm long, anthers 0.4 by 0.2 mm; ovary hairy, with latex glands; ovules 1 or 2. *Pods* descending, oblong, round in cross-section, with 4 fringed wings, 5–6 by 2–3 mm, hairy, dehiscent, endocarp not blotched. *Seeds* 1 or 2, round in cross-section, 1.5 by 1.5 mm, dark brown.

Distribution. India, Java, Madura, Bali, Timor.

Habitat. Periodically much desiccating heavy soils; agricultural fields, grassy localities, desiccated pools, roadsides. Altitude 0–400 m.

Vernacular name. Rom-taroman (Java).

Notes. 1. In 1798 Wendland described *I. glandulosa* with as German name 'Drüsige Indigo'. In 1803 Willdenow also described an *I. glandulosa*, also with the German name 'Drüsige Indigo'. From the descriptions it is obvious that they both meant the same species. Willdenow referred to Roxburgh, who wrote this name on the herbarium label. In his *Flora Indica*, Roxburgh (1832) also gave *I. glandulosa*, but with Willdenow as author. Later Wight and Arnott (1834) gave *I. glandulosa* with Roxburgh as author and they referred to the J.E. Smith Herbarium, and also to Willdenow. In the herbarium of J.E. Smith we found the specimen labelled by Roxburgh dates 1789. Most probably also Wendland received material from Roxburgh.

2. Because of the lower number of ovules (1 instead of 2), Baker described the variety *sykessii*; the name was taken from a herbarium sheet of Griffith. Besides this lower number of ovules we found no correlating characters.

15. *Indigofera hirsuta* L.

I. hirsuta L., Sp. Pl. (1753) 751; Miq., Fl. Ind. Bat. 1, 1 (1855) 304; Benth., Fl. Austr. (1864) 198; Baker in Gibbs, J. Linn. Soc. Bot. 42 (1914) 68; Gagnep., Fl. Gén. I-C. 2 (1916) 429; Merr., Enum. Borneo (1921) 302; Ridley, Fl. Mal. Pen. 1 (1922) 580; Merr., Enum. Philip. 2 (1923) 275; Baker f., Legum. Trop. Afr. (1926) 146; Craib, Fl. Siam. Enum. 1 (1928) 378; Ali, Bot. Notis. 3 (1958) 559; Gillett, Kew Bull., Add. Ser. 1 (1958) 109; in Hutch. e.a., Fl. W. Trop. Afr. 1, 2 (1958) 541; Kew Bull. 14 (1960) 290; Backer & Bakh. f., Fl. Java 1 (1964) 591; Gillett, Kew Bull. 24 (1970) 500; Gillett e.a., Fl. Trop. E. Afr., Legum. 3, Pap. 1 (1971) 310; Verdc., Man. New Guinea Legum. (1979) 351. — Type: Hermann vol. 1, fol. 60, no. 172 (BM), Sri Lanka.

I. indica Mill., Gard. Dict. ed. 8 (1768) 4. — Type: unknown, not found in BM.

I. astragalina DC., Prod. 2 (1825) 228; Gillett, Kew Bull., Add. Ser. 1 (1958) 110; Kew Bull. 14 (1960) 290; Kew Bull. 24 (1970) 500; Ali, Fl. W. Pak. 100 (1977) 79. — Type: *Perrottet 143* (G-DC, L microfiche), Senegal.

- I. barbata* Desv., Ann. Sc. Nat. Ser. I, 9 (1826) 410. — Type: unknown, not found in P.
I. ferruginea Schum. & Thonn., Beskr. Guin. Pl. (1829) 370. — Type: *Thonning 35* (C), Ghana, Gold Coast.
I. fusca G. Don, Gen. Syst. 2 (1832) 211. — Type: *G. Don s.n.* (BM), Africa, St. Thomé.
I. angustifolia Blanco, Fl. Filip. ed. 1 (1837) 596; Merr., Sp. Blanco. (1918) 179. — [*I. tinctoria* Naves in Blanco, Fl. Filip. ed. 3 (1877–83) t. 163, non L.; Merr., Sp. Blanco. (1918) 179.] — Type: *Merrill Sp. Blanco. 403* (BM, K, L, US), Luzon, Pangasian Prov., Umingan.
I. hirsuta L. var. *pumila* Welw. ex Baker, Fl. Trop. Afr. 2 (1871) 89; Baker f., Legum. Trop. Afr. (1926) 146. — Type: *Welwitsch 2057* (K), Angola, Huilla.

Shrub, up to 1.5 m high; branches erect, striate. Biramous hairs spreading with very unequally long arms, almost simple. Stipules narrowly triangular, 10–12 mm long; rachis up to 7 cm long, ultrajugal part 6–10 mm long; stipellae 1–2 mm long. Petiolules 1.5–3 mm long. *Leaflets* 5–9, opposite, elliptic to obovate, terminal ones 2.5–3.5 by 1–2 cm, lateral ones 1.5–3 by 0.7–1.5 cm, base cuneate, apex rounded, mucro 0.2 mm long, nerves distinct. *Racemes* 10–20 cm long; bracts linear triangular, c. 4 mm long, apex acute, caducous. Pedicels c. 2 mm long. *Flowers* up to 6 mm long; calyx cup 1.5 by 2 mm, teeth linear triangular, 3.5–5 by 0.5 mm; standard 4–5 by 3–4 mm, hairy on the back; wings 4–5 by 1.2–1.5 mm, glabrous, upper margin with hairs, lateral furrow 0.3 mm long; keel petals 4–5 by 1.2–1.5 mm, glabrous, upper margins with hairs, lateral pocket 0.7 mm long; staminal tube 4.5 mm long; anthers 0.4 mm long; ovary glabrous; ovules 6–9. *Pod* reflexed, straight, rounded in cross-section, 1.5–2 cm by 1 mm, with spreading hairs, dehiscent; endocarp blotched. *Seeds* 6–9, cubic, brown.

Field notes. Standard red with white blotch at the base, wings red, keel white red at the top.

Distribution. Pantropical.

Habitat. Grasslands, savanna, waste places, riverbanks, beach vegetation, dry deciduous forest. Altitude 0–1500 m.

Vernacular names. Tagem-tageman, tagom ballang, tinta-tintahan (Luzon), taiúman, taium-taiúman (Philippines), ghermie bomong (Malaya), djieging, djoekoet loeloet, tomaran, tomtoman, tom-tomanj (Java), tebawang amdjah (Celebes), tildjil, wiereka (New Guinea).

16. *Indigofera kerrii* de Kort & Thijssse, *spec. nov.*

Foliola 7–11, opposita, elliptica, basi obtusa ad rotundata, apice rotundata. Flores 6 mm longi, calycis dentibus deltoideis, vexillo strigoso, ovario 7–11-ovulato glabro. Legumen patens rectum, strigosum, endocarpo maculato. — Typus: *Kerr 4632* (BM), Thailand, Keng Soi, Me Pinj Rapids.

Shrub, 1–1.5 m high; branches erect, striate. Biramous hairs adpressed white with equally long arms. Stipules narrowly triangular, 1.5–2 by 0.3 mm; rachis 5–10 cm long; ultrajugal part 5–7 mm long; stipellae c. 1 mm long. Petiolules 1–2 mm long. *Leaflets* 7–11, opposite to subopposite, elliptic, 15–30 by 10–15 mm, base obtuse to rounded, apex rounded, mucro 0.5 mm long, nerves not visible. *Racemes* 5–8 cm

long; bracts narrowly triangular, 1–1.5 mm long. Pedicels 2 mm long. *Flowers* 6 mm long; calyx cup 1 by 1.5 mm, teeth deltoid, 0.5 by 0.5 mm; back of standard and keel petals hairy; wings ciliate; ovary glabrous; ovules 7–11. *Pod* spreading, straight to slightly curved, 30–40 by 3 mm, strigose; endocarp blotched.

Distribution. Thailand.

Habitat. Open grass. Altitude 300–500 m.

Note. First distinguished as new by Mrs. K. Boonyamalik (AAU), but not published.

17. *Indigofera lacei* Craib

I. lacei Craib, Kew Bull. (1910) 382; Fl. Siam. Enum. 1 (1928) 378. – Type: *Lace* 4268 (K), Burma, Maymyo Plateau.

Shrub, 2.5 m high; branches erect, striate. Biramous hairs more or less adpressed white or brown, 0.5 mm long, with equally long arms. Stipules narrowly triangular, 5–10 by 0.5 mm; rachis 2–18 cm long, ultrajugal part 4–8 mm long; stipellae narrowly triangular, 0.5–1.5 mm long. Petiolules 1–1.5 mm long. *Leaflets* (3–7–)17–31, opposite, elliptic, 8–26 by 4–11 mm, base cuneate to obtuse, apex obtuse to rounded, mucro 0.8–1 mm long; nerves not visible; venation reticulate. *Racemes* 4–25 cm long, longer than corresponding leaf; bracts narrowly triangular, 1.2 by 0.2 mm, exceeding the flowerbuds. Pedicels 2.5–4 mm long. *Flower* 8–10 mm long; calyx cup 1–1.5 by 2–3 mm, teeth deltoid to triangular, 0.8–1 by 0.5–1 mm; standard elliptic, 8.5 by 6 mm, hairy on the back; wings 8 by 2.5 mm, glabrous, margins ciliate; keel petals 8 by 2.5 mm, hairy, margins ciliate, lateral pocket 0.5 mm long; staminal tube 7 mm long; anthers c. 0.5 by 0.5 mm; ovary glabrous when young, later with a few hairs along the margins; ovules 6–10. *Pod* straight, ascending, rounded in cross-section, 35–45 by c. 3 mm, glabrous, dehiscent; endocarp not blotched. *Seeds* 6–10, quadrangular, brown, not pitted.

Field notes. Petals yellowish.

Distribution. Burma, Thailand.

Habitat. Bamboo-jungle, open deciduous forest. Altitude 600–1900 m.

Vernacular names. Khram, ta kleu mi (Thailand).

18. *Indigofera laxiflora* Craib

I. laxiflora Craib, Kew Bull. (1912) 148; Gagnep., Fl. Gén. I.-C. 2 (1916) 432; Craib, Fl. Siam. Enum. 1 (1928) 379. – Types: *Kerr* 1388 (BM, E, K), Thailand, Doi Sute; *Kerr* 1978 (BM, E, K), Thailand, Doi Sute.

Shrublet, c. 60 cm high. Biramous hairs adpressed with equally long arms, brown and white. Stipules narrowly triangular, 2–3 by 0.2 mm; rachis 3.5–10.5 cm long, ultrajugal part 8–12 mm long; stipellae narrowly triangular, 1–1.5 mm long. Petiolules 1.5–2 mm long. *Leaflets* (5–)7–11(–13), opposite, elliptic to obovate, terminal ones 23–52 by 9–22 mm, lateral ones 13–37 by 8–22 mm, base acute, apex

rounded to truncate, mucro 0.8 mm long. *Racemes* 8–26 cm long; bracts narrowly triangular, 1.5–2 mm long. Pedicels 3–5 mm long. *Flowers* 8 mm long; calyx cup 2 by 2 mm, teeth triangular, 1 by 0.6 mm; standard elliptic, 9 by 6 mm, hairy at the back; wings 8.5 by 3.5 mm, sericeous, margins ciliate; keel 8 by 4 mm, hairy in the apical part, glabrous in the basal part, margins short-ciliate, lateral pocket 1 mm long; staminal tube 8 mm long, anthers 1 by 0.4 mm; ovary glabrous; ovules 14. *Pod* straight, descending to spreading, laterally flattened, somewhat quadrangular in cross-section, 5.5–6 by 0.3 cm, with few small brown hairs; endocarp unknown.

Field notes. Flowers violet.

Distribution. Thailand.

Habitat. Open grassy jungle, open grassy forest, bamboo-jungle. Altitude 600–1500 m.

19. *Indigofera linifolia* (L. f.) Retz. — Fig. 4.

I. linifolia (L. f.) Retz., Obs. 4 (1786) 29; 6 (1791) 33, t. 2; Decne., Herb. Timor. Descr. (1835) 140; Miq., Fl. Ind. Bat. 1, 1 (1855) 315; Benth., Fl. Austr. 2 (1864) 195; Baker in Hook. f., Fl. Br. India 2 (1876) 92; Gagnep., Fl. Gén. I.-C. 2 (1916) 425; Merr., Enum. Philip. 2 (1923) 275; Craib, Fl. Siam. Enum. 1 (1928) 379; Ali, Bot. Notis. 3 (1958) 546; Gillett, Kew Bull., Add. Ser. 1 (1958) 35; Backer & Bakh. f., Fl. Java 1 (1964) 590; Verdc., Man. New Guinea Legum. (1979) 353. — *Hedysarum linifolium* L. f., Suppl. (1781) 331. — Type: *Linnaeus* 921-5 (LINN), Ind. Or.

I. polygonoides Wendl., Bot. Beob. (1798) 55. — Type: unknown.

Sphaeridiophorum linifolium Desv., J. Bot. 3 (1813) 125, t. 6, f. 35. — Type: Plate 6, fig. 35 in Desv., l.c.

I. roxburghii Tausch, Flora 14 (1831) 671. — Type: Plate 195 in Roxb., Pl. Corom. 2 (1798).

I. albicans Span., Linnaea 15, 1 (1841) 190. — Type: *Spanoghe* s.n. (L), Timor.

Sphaeridiophorum abyssinicum Jaub. & Spach, Illustr. (1857) t. 494. — Types: Plate 494 in Jaub. & Spach, l.c.; *Schimper* s.n., viii-1852 (P, n.v.), Abyssinia, Mt Dalaka.

Prostrate or erect greyish green shrublet, 15–100 cm high. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, partly connate with the petiole, 2.5–3 mm long; petioles 2.5–3 mm long, pulvinate. *Leaves* simple, elliptic to linear, mostly all leaves linear, but sometimes all elliptic, 5–40 by 2–4 mm, base cuneate, apex acuminate. *Racemes* up to 15 mm long; bracts narrowly triangular, 2.5 mm long, caducous. Pedicels c. 1 mm long. *Flowers* 4–5 mm long; calyx cup 1 by 1 mm, teeth narrowly triangular, 2 mm long; standard elliptic, 4–4.5 by 2–2.5 mm, hairy on the back; wings 3.5–4 by 1.5 mm, glabrous; keel 3.5–4.5 by 1–1.5 mm, glabrous, lateral pocket 0.5 mm long; staminal tube 3.5–4.2 mm long, anthers 0.3 by 0.2 mm, ovary globose, at first glabrous, hairy when the anthers are ripe; ovule 1. *Pods* globose, beaked, 2 by 1.5 mm; endocarp not blotched. *Seed* 1, rounded, laterally flattened, 1.2 by 1 mm.

Field notes. Flowers red.

Distribution. Sudan, Eritrea, Ethiopia, Afghanistan, Pakistan, Kashmir, India, E. Pakistan, Sri Lanka, Ryukyu I., China (Yunnan, Chechuan), Taiwan, Burma, Thailand, Cambodia, Vietnam, Luzon, Java, Madura, Bali, Sumbawa, Sumba, Flores,

Solor, Alor, Wetar, Timor, New Guinea, W. Australia, Northern Territory, Queensland, New South Wales. Map 2 (p. 96).

Habitat. Grasslands, savanna, cultivated grounds, sandy roadsides, beaches, open grassy deciduous forest. Altitude 0–760 m.

Vernacular names. Bungah-merah, rhema-mon-hoi (Flores), ikela wol, pina bo (Alor), morokodi, rumba mutung (Sumba), muramura (New Guinea).

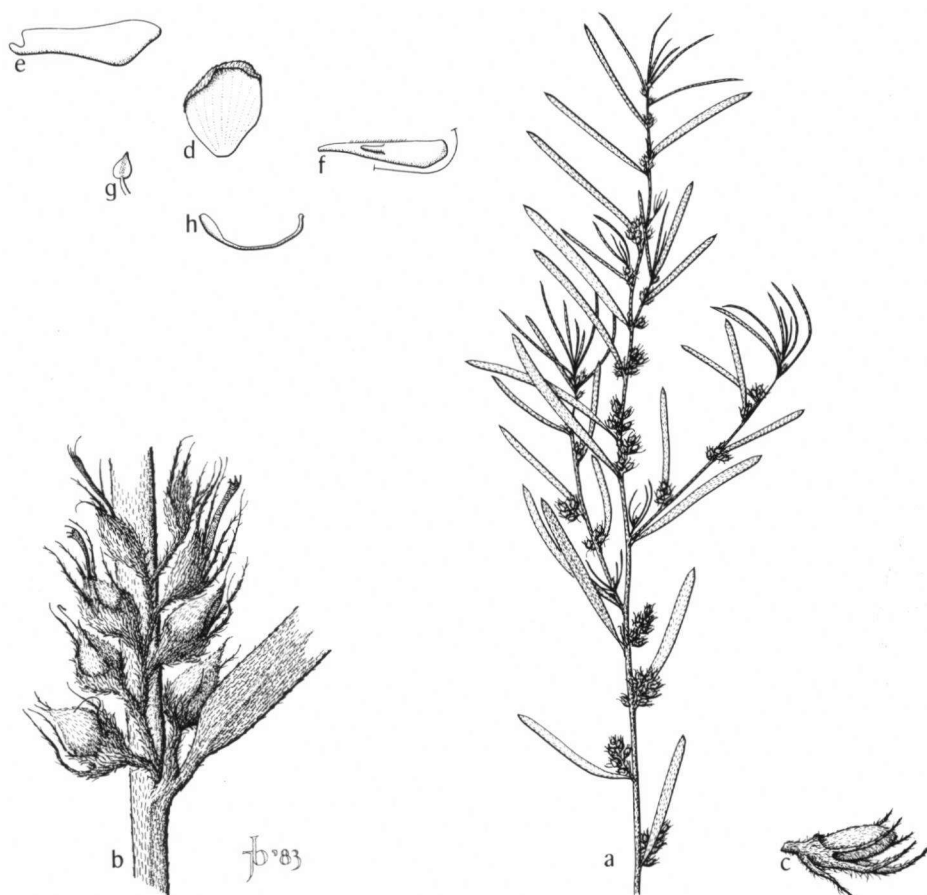


Fig. 4. *Indigofera linifolia* (L. f.) Retz. a. Habit, $\times 1$; b. detail of flowering raceme, $\times 6$; c. flower, $\times 5$; d. standard inside, $\times 5$; e. wing petal, $\times 5$; f. keel petal, curved line indicates connate part, $\times 5$; g. anther, $\times 20$; h. ovary, $\times 5$ (Iboet 30, L.).

20. *Indigofera linnaei* Ali

I. linnaei Ali, Bot. Notis. 3 (1958) 549; Backer & Bakh. f., Fl. Java 1 (1964) 591; Verdc., Man. New Guinea Legum. (1979) 353. — *Hedysarum prostratum* L., Mant. 1 (1767) 102. — *I. enneaphylla* L., Mant. 2 (1771) 272, nom. illeg.; Mant. 2, App. 571; Miq., Fl. Ind. Bat. 1, 1 (1855) 315; Benth., Fl. Austr. 2 (1864) 196; Gagnep., Fl. Gén. I.-C. 2 (1916) 426; Craib, Fl. Siam. Enum. 1 (1928) 378; Gillett, Kew Bull., Add. Ser. 1 (1958) 35. — *I. prostrata* (L.) Domin, Bibl. Bot. 89 (1926) 187. — *I. dominii* Eichler in Black, Fl. S. Austr. ed. 2, suppl. (1965) 190. — Type: Sloane vol. 95, f. 186 (BM), Coromandel.

Hedysarum prostratum Burm. f., Fl. Ind. (1768) 168, t. 55, f. 1. — Type: Plate 55, f. 1 in Burm. f., l.c.

Shrublet, 20–90 cm high; with a c. 30 by 0.5 cm long taproot; branches ascending. Biramous hairs adpressed with equally long arms. Stipules triangular, 2–4 by 2 mm; rachis 3–18 mm long, ultrajugal part c. 0.5 mm long; stipellae narrowly triangular, 0.6 mm long. Petiolules 0.5 mm long. *Leaflets* 3–10, alternate, ovate to narrowly ovate, the terminal one 5–15 by 3–5 mm, the lateral ones 3–13 by 2–4 mm, base cuneate, apex obtuse to truncate, mucro 0.1 mm long, nerves not visible. *Racemes* 0.5–2.5 cm long; bracts triangular, 2 by 1 mm. Pedicels 0.5 mm long. *Flowers* 3–4 mm long; calyx cup 1.5 by 1.5 mm, teeth narrowly triangular, 2.5 mm long; standard broadly ovate to orbicular, 3–4.5 by 2.5–4 mm, hairy on the back; wings 3–4 by 1–1.5 mm, surfaces glabrous, margins shortly ciliate; lateral furrow c. 0.5 mm long; keel petals 3–4 by 1.5 mm, glabrous, margins short-ciliate, lateral furrow c. 0.5 mm long; staminal tube 2.5–4 mm long, anthers 0.5 by 0.3 mm; ovary strigose; ovules (1–)2–3. *Pod* straight, spreading, globose, 3–8 by 1.5–2 mm, hairy, slightly beaked; endocarp not blotched. *Seeds* (1–)2–3, if one-seeded than most of the pods in the same plant one-seeded, rounded, globulose, c. 1 by 1 mm, light brown.

Field notes. Flowers red or orange red.

Distribution. Pakistan, India, Sri Lanka, Burma, Thailand, Vietnam, Celebes, Java, Madura, Lombok, Flores, Timor, New Guinea, N., W. and S. Australia, New South Wales.

Habitat. Grasslands and savanna; roadsides; dikes. Altitude 0–400 m.

Vernacular names. Dedekan, troepala (Java), met gamet (Madura).

Notes. 1. It causes 'Birdsville disease' with horses in Australia.

2. In the Mantissa 1, Linnaeus (1767) described *Hedysarum prostratum*. He referred to Burman's Flora Indica t. 54, f. 2. This reference seems strange because Burman's work was published in 1768. Also the reference is not correct: the plate should be t. 55, f. 1. Ali (1958) suggested that Linnaeus saw the illustrations of Burman before they were published and that the number of the table and figure had changed in the publication. In his second edition of the Mantissa in 1771 Linnaeus described *I. enneaphylla*, with as a synonym among others *Hedysarum prostratum*, Mant. 496. This reference to the Mantissa 1 is not quite right: the page number should have been 102. In the appendix of the Mantissa 2 (p. 571) he referred to the correct page and also to Burman's Flora Indica 168, t. 55, f. 1. Linnaeus should have used the older epitheton 'prostrata', thus the name *I. enneaphylla* is illegitimate; the correct name should have been *I. prostrata*. Domin (1926) made that combination,

overlooking the following earlier homonyms: *I. prostrata* Willd. (1805), *I. prostrata* Perr. ex DC. (1825), *I. prostrata* Roxb. (1832), and *I. prostrata* Klein ex W. & A. (1834). So also the combination of Domin is illegitimate. Ali (1958) proposed the new name *I. linnaei*. Eichler (1965), unaware of Ali's new name, also discovered that Domin's combination was illegitimate, and gave the taxon the name *I. dominii*.



Fig. 5. *Indigofera luzonensis* de Kort & Thijssse. a. Habit, $\times 0.5$; b. young flower, $\times 2.5$; c. standard inside, $\times 2.5$; d. wing petal, $\times 2.5$; e. keel petal, $\times 2.5$; f. anthers, $\times 5$; g. ovary, $\times 2.5$ (Williams 1288, US).

21. *Indigofera luzonensis* de Kort & Thijssse, *spec. nov.* – Fig. 5.

I. luzonensis ab *I. zollingeriana* floribus longioribus, carinae cornuibus lateralibus longioribus, ovulis paucioribus, leguminibus erectis, lateraliter compressis, dehiscentibus differt. – *T y p u s* : BS 5043 (L, holo; iso BO, K, P, US), Luzon, Rizal Prov., Montalban.

Shrub, branches erect. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 6–7 mm long; rachis 6–25 cm long, ultrajugal part 5–6 mm long; stipellae 1 mm long, persistent. Petiolules 2–2.5 mm long. *Leaflets* 7–23, opposite, sometimes a few alternating, narrowly elliptic to narrowly ovate, 22–43 by 6–15 mm, base obtuse to rounded, apex acute, mucro 0.7 mm long; nerves not visible. *Racemes* 7–15 cm long; bracts linear, 2 mm long; pedicels 1–2 mm long. *Flowers* 8–10 mm long; calyx cup 1.5 by 3 mm; teeth deltoid, 0.5–1 by 1–1.5 mm; standard elliptic, 9–9.5 by 5–7 mm, hairy on the back; wings 6.5–7.5 by 1.5–2 mm, glabrous, short-ciliate at the top; keel 8–9 by 3 mm, hairy and short-ciliate along mar-

gins; lateral pocket 2 by 1 mm, staminal tube 8 mm long, anthers 1 by 0.5 mm; ovary with few hairs; ovules 14 or 15. *Pod* ascending, laterally flattened, beaked, 24–30 mm long, with few biramous hairs, dehiscent; endocarp blotched. *Seeds* 10–11, 2 by 1.5 mm, smooth, dark brown, arranged like a pile of coins.

Distribution. Luzon.

22. *Indigofera minbuensis* Gage

I. minbuensis Gage, Rec. Bot. Surv. India 3 (1908) 40. — Type: *Shaik Mokim s.n.* (K), Upper Burma, Minbu, Arracan Yomahs.

Branches erect, striate. Biramous hairs adpressed 0.3 mm long, white, with equally long arms. Stipules narrowly triangular, 2–2.5 mm long. Petioles 2.5–3 mm long, not pulvinate. *Leaves* simple, linear, 4–8 by 0.4–0.6 cm, base attenuate, apex cuspidate, mucro c. 1 mm long; nerves sometimes visible, venation reticulate. *Racemes* 1–2.5 cm long; bracts narrowly triangular, c. 1 mm long, caducous; pedicels 1.5 mm long. *Flowers* unknown, but according to the original description small; calyx teeth triangular, 1 mm long; standard persistent. *Pod* straight, descending, rounded in cross-section, with hairs; endocarp blotched. *Seeds* (2–)4–5.

Distribution. Upper Burma.

Habitat. Altitude 1200 m.

23. *Indigofera nigrescens* Kurz ex King & Prain

I. nigrescens Kurz ex King & Prain, J. As. Soc. Beng. 67, ii (1898) 286; Gagnep., Fl. Gén. I.-C. 2 (1916) 431; Merr., Enum. Philip. 2 (1923) 275; Backer & Bakh. f., Fl. Java 1 (1964) 592. — Type: *King's coll.* 203 (CAL), Upper Burma, Maymyo Hills.

Shrub; branches erect, striate. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 6–8 by 0.5 mm; rachis 6–11 cm long, ultrajugal part 5–7 mm long; stipellae 1 mm long. Petiolules 2 mm long. *Leaflets* 13–19, opposite, elliptic, 15–20 by 8–10 mm, base obtuse, apex obtuse to rounded, mucro 0.3 mm long, nerves not visible. *Racemes* 10–17 cm long, longer than the corresponding leaves; bracts narrowly triangular, 3–4 by 0.5 mm. Pedicels 1–1.5 mm long. *Flowers* 5–6 mm long; calyx cup 1 by 2 mm, teeth triangular, 0.7–1 by 0.5–0.7 mm; standard orbicular, 5 by 4 mm, hairy on the back; wings 5 by 1.5 mm, glabrous but margins short-ciliate, the lower margin stronger; keel 5 by 2 mm, hairy at the top, margins short-ciliate; lateral pocket 0.7 by 0.5 mm; staminal tube 4 mm long, anthers 0.5 by 0.5 mm; ovary glabrous; ovules 4–6. *Pod* straight, spreading to descending, round in cross-section, 20–25 by 2.5 mm, dehiscent; endocarp not blotched. *Seeds* 4–6, globose, 1.5 by 1.5 mm, smooth, light brown.

Distribution. China, Assam, Burma, Thailand, Laos, Vietnam, Luzon, Java.

Habitat. Altitude 700–2100 m.

24. *Indigofera nummularifolia* (L.) Livera ex Alston

- I. nummularifolia* (L.) Livera ex Alston, Trim. Handb. Fl. Ceyl. 6, suppl. (1931) 72; Gillett, Kew Bull., Add. Ser. 1 (1958) 8. – *Hedysarum nummularifolium* L., Sp. Pl. (1753) 746. – Type: Hermann vol. 3, fol. 10 (BM), Sri Lanka.
- Hedysarum rotundifolium* Vahl, Symb. Bot. 2 (1761) 81. – *Onobrychis rotundifolia* (Vahl) Desv., J. Bot. 3 (1814) 80; DC., Prod. 2 (1825) 348. – Type: Plate 433, f. 1 in Pluk., Alm. 5.
- I. echinata* Willd., Sp. Pl. 3 (1803) 1222; Roxb., Fl. Ind. 3 (1832) 370; W. & A., Prod. (1834) 198; Gagnep., Fl. Gén. I.-C. 2 (1916) 425. – *Acanthonotus echinata* (Willd.) Benth. in Hook. f., Fl. Niger (1849) 293; Miq., Fl. Ind. Bat. 1, 1 (1855) 316. – Type: Herb. Willdenow, collector unknown (B, L microfiche), India.
- Hedysarum erinaceum* Poir. in Lamk., Encycl. 6, 2 (1806) 398. – Type: Herb. Lamarck (P).
- Hedysarum cuneifolium* Roth, Nov. Sp. Pl. (1821) 357. – *Onobrychis cuneifolia* (Roth) DC., Prod. 2 (1825) 348. – Type: Heyne s.n. (n.v.), Ind. Or. (sub nomine *Hedysarum onobrychis*).

Shrublet; branches ascending. Biramous hairs adpressed, 0.5–1 mm long, with equally long arms. Stipules narrowly triangular, 2–2.5 by 0.7 mm. Petioles 2–3 mm long, pulvinate. Leaves simple, broadly ovate to obovate, 10–28 by 11–24 mm, base acute to rounded, apex obtuse to rounded, mucro 0.3 mm long, hairy, more or less ciliate along the margins; nerves alternating, 3–5 pairs. Racemes 4–5 cm long; bracts narrowly triangular, 1.5 mm long, not exceeding the bud. Pedicels 1 mm long. Flowers 4 mm long; calyx cup 1 by 0.8 mm, teeth narrowly triangular, 1.5–2 mm long; standard broadly ovate, 3 by 1.5 mm, hairy on the back; wings 2.5 by 0.8 mm, without upper auricle, lateral furrow absent, glabrous; keel 3.5 by 1 mm, longer than the standard, without upper auricle, glabrous, lateral pocket small, broad and obtuse; staminal tube 2–2.5 mm long; anthers 0.1 by 0.1 mm; ovary with a few hairs at dorsal side, 2–2.5 mm long; ovules 2. Pod falcate, echinate at the ventral margin with curved-tipped spines, ventral suture zig-zag, 7 by 4 mm, with few hairs; endocarp not blotched. Seeds 1, oval, flattened, narrowly triangular in cross-section, 0.3 by 1.8 mm, reddish brown.

Distribution. Senegal, Sudan, Guinee-Bissau, Guinea, Ivory Coast, Gold Coast, Nigeria, Cameroon, Gabon, Zaire, Tanzania, Zambia, Zimbabwe, Madagascar, India, Sri Lanka, Thailand, Cambodia, S. Vietnam.

Notes. 1. Gillett (1958) stated that the leaves of *I. nummularifolia* are adpressed strigose in Africa and glabrous in India. We only observed strigose leaves.

2. In 1753 Linnaeus described *Hedysarum nummularifolium*. Willdenow (1803) described *I. echinata*. Roxburgh (1932) placed *Hedysarum nummularifolium* in the synonymy of *I. echinata*, which according to the present rules should have been done reversely. Livera and Alston correctly made the combination *I. nummularifolia*. *Indigofera echinata* was also the type species of the new genus *Acanthonotus*, described by Bentham in 1849. This genus was later reduced to subgenus of *Indigofera* (see also 'History of the genus', p. 89).

25. *Indigofera oblongifolia* Forssk.

- I. oblongifolia* Forssk., Fl. Aegypt. Arab. (1775) 137; Ali, Bot. Notis. 3 (1958) 546; Gillett, Kew Bull., Add. Ser. 1 (1958) 116; in Hutch. e.a., Fl. W. Trop. Afr. 1, 2 (1958) 542; Backer & Bakh. f., Fl. Java 1 (1964) 592. — Type: *Forsskäll s.n.* (C), Egypt, Arabia.
- I. lotoides* Lamk., Dict. 3 (1789) 247. — Type: *Sonnerat s.n.* (P), Cape Good Hope.
- I. paucifolia* Del., Fl. Egypt. (1813) 107; Miq., Fl. Ind. Bat. 1, 1 (1855) 312. — Type: Plate 37, f. 22 in Del., l.c.
- Bremontiera ammoxydon* DC. var. *burmanii* DC., Prod. 2 (1825) 353. — Type: Herb. De Candolle (G-DC, L microfiche).
- I. argentea* Buch.-Ham. ex Roxb. [Hort. Beng. (1814) 57, nom. nud.] Fl. Ind. 3 (1832) 374. Type: *Rottler s.n.*, Oct. 1795 (K).
- I. desmodioides* Baker, Kew Bull. (1894) 331. — Type: *Bent 185* (K), Yemen, Hadhramant.
- I. oblongifolia* Forssk. var. *carposphigma* Schweinf., Bull. Herb. Boiss. 4, App. 2 (1896) 240. — Type: *Schweinfurth 88* (K), Arabia, Aden, Wadi, Ma'alla.

Shrublet. Biramous hairs adpressed with equally to somewhat unequally long arms. Stipules narrowly triangular, 3–5 mm long; rachis 3–30 mm long, ultrajugal part 2–6 mm long; stipellae absent. Petiolules 1–1.5 mm long. *Leaflets* 1–5, alternate, sometimes almost opposite, obovate to narrowly obovate, the terminal 16–40 by 5–10 mm, the lateral 12–24 by 4–8 mm; base cuneate, apex acuminate, mucro 0.1 mm long. *Racemes* 1.5–8 cm long; bracts narrowly triangular, 1.5 mm long, caducous. Pedicels 1–1.5 mm long. *Flowers* 4 mm long; calyx cup 1 by 1 mm, teeth triangular, 0.7–1 mm long; standard orbicular, 4 by 4 mm, hairy on the back; wings 3–3.5 by 1–1.5 mm, glabrous, margins short-ciliate, lateral furrow 1 mm long; keel petals 3–3.5 by 1.2–1.5 mm, glabrous, ciliate above the 0.5 mm long lateral pocket; staminal tube 3–3.5 mm long; anthers 0.5 by 0.5 mm; ovary with hairs; ovules 7–9. *Pods* descending, slightly curved, constricted between the seeds, rounded in cross-section, 1–2 by 0.2 cm, hairy; endocarp blotched. *Seeds* (3–)7–9, oval, 2 by 1 mm, light brown to yellow.

Distribution. Tropical Africa to N. India, Sri Lanka, probably introduced in Java.

Habitat. Grassfields, roadsides, especially near the coast. Altitude 0–2 m.

Vernacular name. Tom (Java).

26. *Indigofera parkesii* Craib

- I. parkesii* Craib, Not. Roy. Bot. Gard. Edinb. 36 (1913) 59. — Type: *Parker s.n.* (K), China.

Branches erect, not striate. Biramous hairs partly apparently simple, spreading, with very unequally long arms, and partly adpressed with equally long arms. Stipules narrowly triangular, 6 by 0.75 mm; rachis 5–8 cm long, ultrajugal part 4–7 mm long; stipellae 1–3 mm long, persistent. Petiolules 1 mm long. *Leaflets* 9–15, opposite, elliptic to ovate, 15–30 by 8–17 mm, upper surface with adpressed hairs with equally long arms, lower surface with apparently simple, spreading hairs, base and apex obtuse to rounded, mucro 1 mm long; nerves alternating, 3–4 pairs; venation reticulate. *Racemes* 3–7 cm long; bracts 2–3 mm long, persistent, shorter than cor-

responding flowerbuds. Pedicels 2–3 mm long. *Flowers* 10–12 mm long; calyx cup 1 by 2 mm; teeth deltoid, 1 by 1 mm; standard narrowly ovate, 11 by 5 mm, tomentose on the back; wings 11 mm long, as long as the keel petals, mainly glabrous, ciliate along the margins; staminal tube 10 mm long; anthers 1 by 0.5 mm, with a tuft of hairs on connective; ovary glabrous; ovules 9 or 10. *Pod* straight, 3–4 by 0.3 cm, glabrous, with 2–3 mm long beak; endocarp blotched. *Seeds* 9 or 10.

Distribution. China.

Note. In the Rijksherbarium (L) two sheets were found in a 'Sumatra' cover, collected by Senn van Basel, probably in the beginning of the 19th century. As localities were noted 'Poothoy, Buffeleiland' and 'Rotseiland'. Neither the collector nor the localities could be traced, but probably the material has been collected in China (Mrs. Van Steenis-Kruseman and Dr. Ding Hou, pers. comm.).

27. *Indigofera reticulata* Franch.

I. reticulata Franch., Pl. Delav. (1889) 153; Craib, Fl. Siam. Enum. 1 (1928) 380. – **Type:** Delavay 1964 (K, P), China, Yunnan.

Shrublet or woody herb. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 4 mm long; rachis 3–4 cm long, ultrajugal part 3 mm long; stipellae 1–1.5 mm long. Petiolules c. 1 mm long. *Leaflets* 9–13, opposite, elliptic to obovate, the terminal one 13–17 by 7–9 mm, the lateral ones 11–18 by 6–9 mm, base obtuse to rounded, apex rounded to retuse, mucro c. 1 mm long; venation reticulate. *Racemes* 2.5–3.5 cm long; bracts narrowly triangular, 2 by 0.2–0.3 mm, not exceeding the flowerbuds. Pedicels 2–3 mm long. *Flowers* 7 mm long; calyx cup 1 by 1.5 mm, teeth (narrowly) triangular, 1.5–2 by 0.5 mm; standard elliptic, 6.5 by 4 mm, hairy on the back, margins ciliate; wings 5.5 by 1.5 mm, with a few hairs, margins ciliate; keel petals 6 by 1.5 mm, with few hairs, margins ciliate, lateral pocket 0.5 mm long; staminal tube 6 mm long; anthers 0.5 by 0.25 mm; ovary hairy; ovules 5 or 6. *Pod* straight, more or less spreading; 2.5 cm long, hairy.

Field notes. Corolla entirely blue.

Distribution. China (Yunnan), Thailand.

Habitat. Disturbed deciduous forest. Altitude 700–1200 m.

28. *Indigofera emmae* de Kort & Thijssse, *spec. nov.*

I. emmae ab *I. cylindracae* foliolis paucioribus, pedicellis brevioribus, calycis dentibus longioribus, connectivo basi apiceque caespitibus pilulorum, ovulis pluribus differt. – **Typus:** Dickason 8536 (L), Burma, Chin Hills.

Shrublet, 20–50 cm high, branches erect, not striate. Biramous hairs adpressed with equally long arms, brown and white ones on lower surface of leaflets and white ones on upper surface of leaflets. Stipules narrowly triangular, 4–5 by 0.5 mm; rachis 1–5 cm long, ultrajugal part 2 mm long; stipellae linear, 1–2 mm long, persistent. Petiolules 1 mm long. *Leaflets* 7–13, opposite, elliptic to obovate, 5–11 by

2.5–6 mm, base obtuse to rounded, apex obtuse to rounded, mucro c. 1 mm long; nerves not visible; venation reticulate. Bud scales often persistent. *Racemes* 3–5 cm long; bracts narrowly triangular, 2.5–3 mm long. Pedicels 2–3 mm long. *Flowers* 8 mm long; calyx cup 1.5 by 2 mm, teeth narrowly triangular, 2–2.5 by 0.5 mm; standard elliptic, 7–8 by 6 mm, tomentose on the back; wings 6–7 by 2 mm, glabrous, margin ciliate; keel petals 7 by 3 mm, hairy outside, especially at the apex, margin ciliate, especially the lower margin; lateral pocket 1–1.5 mm long, staminal tube 6 mm long, anthers with a tuft of hairs at the base; ovary glabrous; ovules 9 or 10. *Pod* spreading to ascending.

Field notes. Flowers blue-red or mauve.

Distribution. Assam, Burma, Thailand.

Habitat. Open grassy ground. Altitude 1800–3000 m.

Note. See additional note on p. 151.

29. *Indigofera sootepensis* Craib

a. subsp. *sootepensis*

I. sootepensis Craib, Kew Bull. (1911) 35; Gagnep., Fl. Gén. I.-C. 2 (1916) 433; Craib, Fl. Siam. Enum. 1 (1928) 381. — Type: *Kerr 684* (BM, E, K), Thailand, Chiang Mai, Doi Sutep.

Shrub, 2 m high. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 7–10 mm long, caducous, rachis 16–20 cm long, ultrajugal part 2 mm long; stipellae narrowly triangular, 2 mm long, persistent. Petiolules 2 mm long, at the base with a bristle of brown hairs. *Leaflets* 35–41, alternating in the lower part of the rachis, opposite in the upper part, elliptic, 18–28 by 7–9 mm, base and apex obtuse to rounded, mucro 1 mm long, upper surface dark bluish green, lower surface light bluish green, both surfaces with 0.3–1 mm long hairs; nervation hardly visible. *Racemes* 4–8 cm long; bracts narrowly triangular, 4 mm long, exceeding the buds. Pedicels 1.5 mm long, at the base with a bristle of brown hairs. *Flowers* 10 mm long; calyx cup 1.5 by 2 mm, teeth deltoid, 0.5 mm long; standard elliptic, 9–11 by 5 mm, hairy on the back; wings 5.5–6 by 2 mm, glabrous; keel 9–9.5 by 2–2.5 mm, hairy at the apex, margins very short-ciliate, lateral pocket 1 mm long; staminal tube 10 mm long, anthers 0.8 by 0.5 mm, with a tuft of hairs at base and apex; ovary glabrous; ovules 8–11. *Pod* straight, spreading to ascending, ± laterally flattened, 4.5 by 0.5 cm, sparsely strigose, dehiscent, endocarp blotched. *Seeds* 8–11, ellipsoid, brown.

Field notes. Flowers red.

Distribution. Thailand, Cambodia, Vietnam.

Habitat. Disturbed deciduous forests. Altitude 50–1000 m.

b. subsp. *acutifolia* de Kort & Thijssse, *subsp. nov.*

I. sootepensis subsp. *acutifolia* a subspecie typica foliis paucioribus, maioribus, angustibus ovatis, apice acuto differt. — Typus: *Larsen 34072* (K, holo, P, iso), Thailand, Maehongson, Khun Yuan.

Shrub, 60–200 cm high; branches erect. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 6 mm long; rachis 10–16 cm long, ultrajugal part 10–17 mm long; stipellae 1.5 mm long. Petiolules 1.5–2 mm long. *Leaflets* 15–19, opposite or subopposite, 30–50 by 12–19 mm, narrowly ovate, base rounded, apex acute, mucro 0.6 mm long; nerves alternating, 10 pairs; venation reticulate. *Racemes* 11–12 cm long; bracts narrowly triangular, 2 mm long. Pedicels 2–3 mm long. *Flowers* 13 mm long; calyx cup 1 by 2.5 mm, teeth deltoid, 0.5 by 1.5–2 mm; standard elliptic, 10–11.5 by 5–6 mm, hairy on the back; wings 7–9 by 1.5–2 mm, glabrous; keel 10–12 by 2–3.5 mm, apex hairy, margins short-ciliate, lateral pocket 0.5 mm long; staminal tube 10 mm long; anthers 1 by 0.5 mm, with a tuft of hairs at base and apex; ovary glabrous; ovules 9. Pod unknown.

Field notes. Flowers reddish, reddish brown.

Distribution. Thailand.

Habitat. Dry dipterocarp forest and pine-dipterocarp forest. Altitude 600–700 m.

Note. The name is taken from a herbarium sheet by Mrs. K. Boonyamalik (AAU) which was not published.

30. *Indigofera spicata* Forssk.

a. var. *spicata*

- I. spicata* Forssk., Fl. Aegypt. Arab. (1775) 138; Gillett, Kew Bull., Add. Ser. 1 (1958) 117; in Hutch. e.a., Fl. W. Trop. Afr. 1, 2 (1958) 543; Backer & Bakh. f., Fl. Java 1 (1964) 591; Gillett e.a., Fl. Trop. E. Afr., Legum. 3, Pap. 1 (1971) 317; Verdc., Man. New Guinea Legum. (1979) 353. — Type: *Forsskal s.n.* (C), Yemen, Bolgose.
- I. hendecaphylla* Jacq., Ic. Pl. Rar. (1781–93) t. 570; Merr., Enum. Philip. 2 (1923) 275, excl. *I. pusilla* Lamk.; Craib, Fl. Siam. Enum. 1 (1928) 378. — '*I. endecaphylla* Jacq.' Lamk., Encycl. Suppl. 3 (1813) 147; Gagnep., Fl. Gén. I.-C. 2 (1916) 438, excl. *I. pusilla* Lamk. — Type: *Jacquin 'coll. 2'* (W), Africa.
- I. anceps* Vahl ex Poir. in Lamk., Encycl. Suppl. 3 (1813) 147. — Type: *Thonning s.n.* (C).
- I. kleinii* W. & A., Prod. (1834) 204. — Type: *Wight 2420* (K), India.
- I. endecaphylla* Jacq. var. *angustifolia* A. Rich., Tent. Fl. Abyss. 1 (1847) 182. — Type: *Schimper 366* (K, W), Ethiopia, Adoense, Mt Scholada.
- I. celebica* Miq., Fl. Ind. Bat. 1, 1 (1855) 311. — Type: *Zollinger 1173* (P), Celebes.
- I. endecaphylla* Jacq. var. *angustata* Harv., Fl. Cap. 2 (1862) 199. — Type: *Gueinzus 195* (K, W), South Africa, Natal.
- I. onobrychoides* Boiv. ex Baill., Bull. Soc. Linn. Paris 1 (1883) 398. — Type: *Boivin 1910* (P, n.v.), Madagascar.
- I. parkeri* Baker, J. Linn. Soc. 20 (1883) 126. — Type: *Parker s.n.* (K), Madagascar.
- I. pectinata* Baker, J. Linn. Soc. 20 (1883) 127. — Type: *Baron 746* (K), Madagascar.
- I. endecaphylla* Jacq. var. *acutifolia* Chiov., Ann. Ist. Bot. Rom. 8 (1903) 88. — Type: *Pappi 283* (F1, n.v.), Eritrea.
- I. endecaphylla* Jacq. var. *parvula* Chiov., Ann. Ist. Bot. Rom. 8 (1903) 88. — Type: *Schweinfurth 1752* (F1, n.v.), Eritrea.
- I. endecaphylla* Jacq. var. *major* Baker f., Legum. Trop. Afr. (1926) 135. — Type: *Macaulay 338* (K), Zimbabwe.

I. bolusii N.E. Brown in Burtt Davy, Man. Fl. Transvaal 2, 24 (1932) 371. — Type: *Bolus* 7722 (K), South Africa, Transvaal, Barberton.

I. neglecta N.E. Brown in Burtt Davy, Man. Fl. Transvaal 2, 24 (1932) 371. — Type: *Burke* s.n. (K), South Africa, Transvaal, Crocodile River.

Shrublet, 40–75 cm high; rooting at the nodes of the twigs, main root up to 50 by 0.5–1 cm; branches ascending, striate. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, apex caudate, 5–6 by 1.5–2 mm; rachis 7–35 mm long, ultrajugal part 1–2 mm long; stipellae narrowly triangular, c. 0.5 mm long. Petiolules c. 1.5 mm long. *Leaflets* (3–)5–10, alternate, sometimes almost opposite, obovate to narrowly obovate, 3–20 by 2–9 mm, base cuneate, apex rounded, mucro 0.2 mm long, upper surface glabrous, sometimes with a few hairs. *Racemes* 5–17 cm long; bracts ovate, apex caudate, 3 by 1 mm. Pedicels c. 1 mm long. *Flowers* 4–6 mm long; calyx cup 1.5 by 1.5 mm, teeth narrowly triangular, 2.5–3 mm long; standard broadly ovate, 4–5.5 by 3–4 mm, strigose on the back; wings 3–4.5 by 1.5–2 mm, glabrous, margins long ciliate along the upper auricle; keel petals 3.5–5 by 2–2.5 mm, hairy, margins ciliate, lateral pocket 1 mm long; staminal tube 3.5–5 mm long, anthers 0.5 by 0.5 mm; ovary glabrous; ovules (7–)9–10. *Pod* descending, straight, somewhat quadrangular to round in cross-section, 2–3.5 by 0.2–0.25 cm, with 2 mm long beak, with a few hairs; endocarp not blotched. *Seeds* 7–9, round, 2 by 1 mm, dark brown.

Field notes. Flowers red.

Distribution. Tropical and South Africa to India, Sri Lanka, Burma, Thailand, Cambodia, Vietnam, Luzon, Mindanao, Malaya, Sumatra, Celebes, Java, Bali.

Habitat. Roadsides, grassfields. Altitude 0–2580 m.

Vernacular names. Basingan, sibar (Sumatra), baleh-angien (Celebes).

Note. Said to be introduced in Java in 1923 from India (Heyne, 1950), but earlier recorded from Celebes: Miquel (1855) mentioned *I. celebica* and we found *Teijsmann* 12373 (before 1898) in L and BO.

b. var. *siamensis* (Hoss.) de Kort & Thijssse, *comb. nov.*

I. siamensis Hoss., Fedde Rep., Nov. Sp. 4 (1907) 291; Craib, Fl. Siam. Enum. 1 (1928) 380. — *I. endecaphylla* Jacq. var. *siamensis* (Hoss.) Gagnep., Fl. Gén. I.-C. 2 (1916) 439. — Type: *Hosseus* 120 (B, lost; BM, K), Thailand, Nakhon Sawan, Wang Djaou.

Shrublet, 20–75 cm high; branches ascending, striate. Biramous hairs adpressed, white, with equally long arms. Stipules narrowly triangular, 5–6 mm long; rachis 5–35 mm long, ultrajugal part 1–3 mm long; stipellae narrowly triangular, 0.5 mm long, caducous. Petiolules 0.5–1 mm. *Leaflets* 4–8, alternate, linear, 8–30 by 1–3 mm, base cuneate to rounded, apex acute to rounded, mucro 0.2 mm long, upper surface glabrous or hairy. *Racemes* c. 4 cm long (not yet mature); bracts ovate to triangular, 3 by 1 mm. Pedicels 1 mm long. *Flowers* 4–5 mm long; calyx cup 1.5 by 1.5 mm, teeth narrowly triangular, 2.5–3 mm long; standard broadly obovate, 4.5–5.5 by 4 mm, hairy on the back; wings 3.5–4.5 by 1.5–2 mm, glabrous, margins

ciliate at dorsal auricle; keel petals 4–5 by 2–2.5 mm, hairy, margins ciliate, lateral pocket 1 mm long; staminal tube 4–5 mm long, anthers 0.5 by 0.5 mm; ovary glabrous; ovules 9 or 10. Pod unknown.

Field notes. Flowers pinkish.

Distribution. Thailand, Vietnam.

Habitat. Scrub jungle, open sandy ground. Altitude 10–640 m.

31. *Indigofera squalida* Prain

I. squalida Prain, J. As. Soc. Beng. 66, ii (1897) 355; Gagnep., Fl. Gén. I.-C. 2 (1916) 439; Craib, Fl. Siam. Enum. 1 (1928) 381. – Type: *King's coll.* 442 (CAL, K), Burma, Shan Hills, Koni, Fort Stedman.

I. polygaloides Gagnep. in Lecomte, Not. Syst. 3 (1916) 198; Fl. Gén. I.-C. 2 (1916) 426. – Types: *Pierre s.n.* (P), Cochinchina, Bien Hoa; *Massie s.n.* (P), Laos; *Thorel s.n.* (P), Laos.

I. changensis Craib, Kew Bull. (1922) 171; Fl. Siam. Enum. 1 (1928) 377. – Type: *Kerr* 3607 (BM, K), Thailand, Me Chang.

Woody herb, c. 60 cm high with tuberous roots; branches erect, striate. Biramous hairs with adpressed equally long arms, or with spreading unequally long arms. Stipules narrowly triangular, 2–2.5 mm long. Petioles 3–4 mm long. Leaves simple, narrowly elliptic to narrowly obovate, 2.5–8.5 by 0.7–2.5 cm, base cuneate, apex acute, mucro 0.5 mm long, both surfaces hairy, lower surface usually with yellow-brown glands; nerves visible. Racemes 1–2 cm long; bracts narrowly triangular, 2–2.5 by 0.5 mm. Pedicels 1–1.5 mm long. Flowers 4–5 mm long; calyx cup 1 by 1.2 mm, teeth narrowly triangular, 1–1.5 by 0.5 mm; standard elliptic, 4–5 by 2.5–3 mm, hairy on the back; wings 3.5–4 by 1 mm, glabrous; keel 4–4.5 by 2 mm, hairy, with latex glands, margins ciliate, lateral pocket 1–1.5 mm long; staminal tube 4–4.5 mm long, anthers elliptic, 0.5 by 0.3 mm; ovary hairy at vexillary side, apical part with latex glands; ovules 5 or 6. Pod descending straight, round in cross-section, 11–14 by 1.5–2 mm, hairy, style usually persistent and then glands still visible; endocarp not blotched. Seeds 3–5, oval, 1.2 by 1 mm, yellow-brown.

Field notes. Flowers reddish orange.

Distribution. China (Kouy-Tcheou), Burma, Thailand, Laos, Cambodia, Vietnam.

Habitat. Disturbed deciduous forest and open grassy grounds. Altitude 100–1100 m.

32. *Indigofera suffruticosa* Mill.

a. subsp. *suffruticosa*

I. suffruticosa Mill., Gard. Dict. ed. 8 (1768) n. 2; Merr., Enum. Philip. 2 (1923) 275; Hochr., Candeloea 2 (1925) 395; Baker f., Legum. Trop. Afr. (1926) 135; Craib, Fl. Siam. Enum. 1 (1928) 381; Merr., Contr. Arn. Arbor. 8 (1934) 75; Burk., Dict. 2 (1935) 1259; Gillett, Kew Bull., Add. Ser. 1 (1958) 105; in Hutch. e.a., Fl. W. Trop. Afr. 1, 2 (1958) 541; Backer & Bakh. f., Fl. Java 1 (1964) 592; Verdc., Man. New Guinea Legum. (1979) 355. – Type: ex Herb. Miller, s.n. (BM).

- I. anil* L., Mant. 2 (1771) 272; Bl., Cat. (1823) 93; DC., Prod. 2 (1825) 225; Decne., Herb. Timor. Descr. (1835) 140; Miq., Fl. Ind. Bat. 1, 1 (1855) 307; Sum. (1860) 114; Gagnep., Fl. Gén. I.-C. 2 (1916) 427. — Type: *Linnaeus 923-20* (LINN).
- I. tinctoria* L. var. *brachycarpa* DC., Prod. 2 (1825) 225. — Type: Herb. De Candolle II-225-32 (G-DC, L microfiche).
- I. anil* L. var. *polyphylla* DC., Prod. 2 (1825) 225. — Type: Herb. De Candolle II-225-33 (G-DC, L microfiche).
- I. micrantha* Desv., Ann. Sc. Nat. Ser. I, 9 (1826) 410. — *I. angolensis* D. Dietr., Syn. Pl. 4 (1847) 1036, nom. superfl. — Type: unknown.
- I. uncinata* G. Don, Gen. Syst. 2 (1832) 208. — Type: unknown collector (BM), Sierra Leone.
- I. anil* L. var. *olygosperma* Miq., Fl. Ind. Bat. 1, 1 (1855) 309. — Based on a descriptive note by Hasskarl, Pl. Jav. Rar. (1848) 335, under *I. coerulea* Roxb. No corresponding herbarium material found.

Shrub, 45-240 cm high; branches erect, striate. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 3-6 mm long; rachis 5-10 cm long, ultrajugal part 0.5-1 cm long; stipellae linear, 0.5-1 mm long. Petiolules 1-1.5 mm long. *Leaflets* (7-)9-15, opposite, narrowly elliptic to narrowly obovate, 10-38 by 3-15 mm, base cuneate, apex acute to rounded, mucro 0.5 mm long, upper surface glabrous or with very few hairs; nerves not visible. *Racemes* 2-6 cm long; bracts narrowly triangular, c. 2 mm long. Pedicels 0.5-1 mm long. *Flowers* 4-5 mm long; calyx cup 1 by 1 mm, teeth triangular, 0.7-1.2 by 0.5 mm; standard ovate to orbicular, 3-4.5 by 2.5-3 mm, hairy on the back; wings 2-4 by 0.8-1.2 mm, glabrous; keel 2.5-4.4 by 1.2-2 mm, hairy, margins not ciliate, lateral pocket 0.5 mm long; staminal tube 4 mm long, anthers 0.5 by 0.5 mm; ovary hairy; ovules 4-6(-7). *Pod* descending, distinctly curved, 1.5-2(-3) cm long by 2 mm, hairy; endocarp blotched. *Seeds* 4-6(-7).

Field notes. Flowers salmon pink to red.

Distribution. Pantropical, but not in tropical East Africa.

Habitat. Roadsides, waste grounds, cultivated grounds, beaches and grassfields. Altitude 0-1800 m.

Vernacular names. Tarom (Malaya), avarai, dan sekebak (Perak), banawan sito bulang, taem, taem-abit, taem-hio, taem-taem (Sumatra), tarum, tarum kembang, tarum siki, tom janti, tom gènjah, tom cantik, tom cantuk (Java), tagom-tagom, tagum-tagum (Borneo), katiawe, mosmose (Tanimbar I.), anil, tagem (Luzon), sangifaria (Mindanao), paúai, tagum, tagun, táyom, táyon, táyum, yagum (Philippines), nila (Celebes), taom, taum (Timor), tarung (Flores).

Note. See note under *I. tinctoria*.

b. subsp. *guatemalensis* (Moc., Sessé & Cerv. ex Backer) de Kort & Thijssse, *stat. nov.*

- I. guatemalensis* Moc., Sessé & Cerv. ex Backer, Voorl. Schoolfl. Java (1908) 77; Backer & Bakh. f., Fl. Java 1 (1964) 591. — Type: unpublished plate of Moc. & Sessé (MA?, n.v.).

Shrub; branches erect, not striate. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 2 by 0.2 mm; rachis 5-7 cm long, ultrajugal part 2 mm long; stipellae linear, 1 mm long. Petiolules 1 mm long. *Leaflets* 13-17, oppo-

site, narrowly elliptic, 10–15 by 3–5 mm, base cuneate, apex acute to obtuse, mucro 0.3 mm long; nerves not distinct. *Racemes* 3–7 cm long; bracts narrowly triangular, 1 by 0.2 mm, caducous. Pedicels 1 mm long. *Flowers* 3 mm long; calyx cup 0.6 by 0.9 mm, teeth triangular, 0.5 by 0.3 mm; standard ovate, 3 by 2 mm, hairy on the back; wings 2.7 by 0.75 mm, glabrous; keel petals 3 by 0.75 mm, at the top hairy, not ciliate, lateral pocket 0.5 mm long; staminal tube 3 mm long; anthers 0.4 by 0.4 mm; ovary with few hairs along the margins; ovules 1–4. *Pod* straight, stipitate, with few hairs, round in cross-section, beaked; beak 1 mm long, 4–10 by 1.5 mm, curved downwards; endocarp blotched. *Seeds* 1–3, 1.5–2 by 1.5 mm.

Distribution. Native of tropical America, locally cultivated in Java, there sometimes adventive but not naturalized (Backer & Bakh. f., 1964).

Vernacular names. Guatemala-indigo (Dutch), tom prèsi (Java).

33. *Indigofera tinctoria* L.

- I. tinctoria* L., Sp. Pl. (1753) 751; Bl., Cat. (1823) 93; DC., Prod. 2 (1825) 224; Miq., Fl. Ind. Bat. 1, 1 (1855) 306; Sum. (1860) 114; Gagnep., Fl. Gén. I-C. 2 (1916) 428; Ridley, Fl. Mal. Pen. 1 (1922) 581; Merr., Enum. Philip. 2 (1923) 276; Hochr., Candollea 2 (1925) 395; Baker f., Legum. Trop. Afr. (1926) 156; Craib, Fl. Siam. Enum. 1 (1928) 382; Burk., Dict. 2 (1935) 1259; Ridley, Kew Bull. (1938) 276; Ali, Bot. Notis. 3 (1958) 567; Gillett, Kew Bull., Add. Ser. 1 (1958) 106; in Hutch. e.a., Fl. W. Trop. Afr. 1, 2 (1958) 541; Backer & Bakh. f., Fl. Java 1 (1964) 592; Gillett, Fl. Trop. E. Afr., Legum. 3, Pap. 1 (1971) 308; Ali, Fl. W. Pak. 100 (1977) 82; Verdc., Man. New Guinea Legum. (1979) 355. — Type: Hermann vol. 3, fol. 20 (BM), Sri Lanka.
- I. houer* Forssk., Fl. Aegypt. Arab. (1775) 137. — Type: *Forsskål s.n.* (C), Yemen.
- I. indica* Lamk., Encycl. 3 (1789) 245. — Type: Herb. Lamarck (P).
- I. sumatrana* Gaertn., Fruct. 2 (1791) 317, t. 148. — Type: Plate 148 in Gaertn., l.c.
- I. anil* L. var. *orthocarpa* DC., Prod. 2 (1825) 225. — *I. orthocarpa* (DC.) Berg in Berg & Schmidt, Darstell. & Beschreib. Offic. Gew. 4 (1863) 30d. — Type: Herb. De Candolle II-225-33 (G-DC, L microfiche).
- I. cinerascens* DC., Prod. 2 (1825) 226. — Type: Herb. De Candolle II-226-47 (G-DC, L microfiche).
- I. ornithopodioides* Schum. & Thonn., Beskr. Guin. Pl. 2 (1828) 146. — Type: Thonning 20 (C), Guinea.
- I. tinctoria* Blanco, Fl. Filip. ed. 1 (1837) 591; Merr., Spec. Blanco. (1918) 179. — Type: Merrill, *Species Blancoanae* 826 (BM, BO, K, L, P, US), Luzon, Manila.
- I. argentea* Blanco, Fl. Filip. ed. 2 (1845) 415; Merr., Spec. Blanco. (1918) 179. — Type: Merrill, *Species Blancoanae* 124 (BM, BO, K, L, US), Luzon, Rizal Prov., Antipolo.
- I. bergii* Vatke, App. Ind. Sem. Berol. (1876) 3. — Type: *Labillardière s.n.* (G), India.
- I. oligophylla* Lamk. ex Baker, Fl. Maurit. (1877) 70. — Type: Plate 626, f. 2 in Lamk., Illus.
- I. tinctoria* L. var. *torulosa* Baker f., Legum. Trop. Afr. (1926) 157. — Type: Warnecke 262 (K), Africa, Togo.

Shrub, 60–100 cm high; branches erect. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 1.5–2 mm long; rachis 3–7 cm long, ultrajugal part 3–4 mm long; stipellae narrowly triangular, 0.5 mm long. Petiolules 1 mm long. *Leaflets* 7–13, opposite, elliptic to obovate, 10–21 by 4.5–12.5 mm, base cuneate/acute, apex obtuse to emarginate, mucro 0.2 mm long, upper surface gla-

brous or with very few hairs; nerves indistinct. *Racemes* 1–5 cm long; bracts narrowly triangular, 1 mm long. Pedicels 1–1.5 mm long. *Flowers* 5 mm long; calyx cup 1 by 1.5 mm, teeth triangular, 0.8 by 0.3–0.5 mm; standard broadly ovate, 4 by 3.5 mm, hairy on the back; wings 3.5 by 1 mm, glabrous, margins short-ciliate; keel petals 4 by 1.5 mm, hairy, especially at the apex, upper margin short-ciliate, lateral pocket 0.5 mm long; staminal tube 3.5 mm long, anthers 0.5 by 0.5 mm; ovary glabrous; ovules 8–12. *Pod* descending, straight or slightly curved, rounded in cross-section, 22–35 by 2.5 mm, glabrous; endocarp blotched. *Seeds* 7–12.

Field notes. Standard purplish green; wings pink, keel greenish.

Distribution. Pantropical.

Habitat. Riverbanks, brushwood, roadsides, grassy fields, cultivated grounds, secondary forests and sandy coasts. Altitude 0–800 m.

Vernacular names. Añil (Spanish), brendel, tom, tom jawa (Java), tom (Sumatra), dágum, tagung-tágung, tágum, taium, taiong-taiúngan, tina-tinaan, tógum (Philippines), entoe (Menado), tanum (Mindoro), talom (Bali), taroem, taroem aloes, taroem kajoe, tenaron (Banda), tilep (Batak).

Note. One of the specimens (*van Ooststroom* 13765, L) has the characters of *I. suffruticosa* but is 10-ovuled and has the large straight pods of *I. tinctoria*, with undeveloped seeds. On the same locality *I. suffruticosa* with curved pods was collected by Van Ooststroom (13764, L). The plant with the straight pods may be a hybrid. See also note under *I. arrecta*.

34. *Indigofera trifoliata* L.

a. subsp. *trifoliata*

I. trifoliata L., Cent. Pl. 2 (1756) 29; Amoen. Acad. 4 (1759) 327; Miq., Fl. Ind. Bat. 1, 1 (1855) 312; Benth., Fl. Austr. (1864) 197; Gagnep., Fl. Gén. I.-C. 2 (1916) 437; Merr., Enum. Philip. 2 (1923) 276; Craib, Fl. Siam. Enum. 1 (1928) 382; Ali, Bot. Notis. 3 (1958) 552; Backer & Bakh. f., Fl. Java 1 (1964) 590; Ali, Fl. W. Pak. 100 (1977) 78; Verdc., Man. New Guinea Legum. (1979) 356. — Type: *Linnaeus* 923-3 (LINN), India.

I. prostrata Willd., Sp. Pl. 3 (1803) 223. — Type: Herb. Willdenow (B, L microfiche).

I. multicaulis DC., Prod. 2 (1825) 223. — *I. trifoliata* L. var. *multicaulis* (DC.) Miq., Fl. Ind. Bat. 1, 1 (1855) 313. — Type: Herb. De Candolle II-223-18 (G-DC, L microfiche), Nepal.

I. peregrina DC., Prod. 2 (1825) 224. — Type: Herb. Burman f. (G, n.v.), sub nomine *Lotus peregrina* L., India.

I. moluccana DC., Prod. 2 (1825) 232. — Type: Herb. De Candolle II-232-107 (G-DC, L microfiche), Moluccas.

I. trifoliata L. var. *angustata* Miq., Fl. Ind. Bat. 1, 1 (1855) 313. — Type: Zollinger s.n. (P, U), Java.

I. vestita Baker in Hook. f., Fl. Br. Ind. 2 (1876) 96, nom. illeg.; non Harvey. — *I. karuppiana* Pallithanan, J. Bomb. Nat. Hist. Soc. 73 (1976) 239. — Type: Wight 670 (K), India.

I. trifoliata L. var. *liukuensis* Matsumura, J. Coll. Sci. Univ. Tokyo 12 (1899) 399. — Types: Tashino (n.v.), Ito 910 (n.v.), Ryukyu I., Okinawa.

I. trifoliata L. var. *brachycarpa* Gagnep., Fl. Gén. I.-C. 2 (1916) 438. — Type: Thorel s.n. (P), Cochinchina.

I. barberi Gamble, Kew Bull. (1919) 222. — Types: Barber 1076 (K), India, Madras, Melpat, S. Arcot; *Beddome* s.n. (n.v.), Endapah Hills; *Bourne* 869 (n.v.), Shevaroy Hills, Salem.

Shrublet, 15–90 cm high; branches erect, not striate. Biramous hairs adpressed with equally long arms. Stipules narrowly triangular, 1 by 0.2 mm. Rachis 7–10 mm long, ultrajugal part absent or 1–2 mm long; stipellae linear, 0.5 mm long, glabrous. Petiolules of the terminal leaflets 1.5–2 mm long, petiolules of the lateral leaflets 1–1.5 mm long. *Leaflets* 3, narrowly obovate, the terminal leaflets 16–21 by 3–5 mm, the lateral leaflets opposite, 15–20 by 3–4 mm; base cuneate, apex rounded, mucro 0.2 mm long; lower surface with dark orange disc-shaped glands; nerves not visible. *Racemes* 5–7 mm long; bracts narrowly triangular, 0.8 by 0.2 mm. Pedicels 1–2 mm long. *Flowers* 2.5 mm long; calyx cup 1.2 by 1.2 mm, teeth narrowly triangular, 1.2–1.5 by 0.4 mm; standard orbicular, 2.2 by 1.8 mm, hairy with latex glands on the back; wings 1.7 by 0.5 mm, glabrous; keel petals 1.7 by 1 mm, hairy and with latex glands around the 0.4 mm long lateral pocket, staminal tube 0.8–1.6 mm long, anthers 0.4 mm long; ovary glabrous; ovules 3–6, in basal area of style with latex glands. *Pod* straight, descending, with thickened margins, laterally flattened, 10–15 by 2 mm, thinly hairy and often with disc-shaped glands, endocarp not blotched. *Seeds* c. 2 by 2 by 1 mm.

Field notes. Flowers red, sometimes yellow?

Distribution. Pakistan to South China to the Ryukyu I., Burma, Thailand, Laos, Vietnam, Luzon, Mindanao, Celebes, Java, Madura, Kangean Arch., Bali, Lombok, Sumba, Flores, Alor, Timor, Tanimbar I., Aru I., New Guinea, Northern Territory of Australia, Queensland. Map 3 (p. 97).

Habitat. Roadsides, grassy localities, fallow agricultural fields, open forests. Altitude 0–1700 m.

Vernacular names. Foil koté (Nusa Tenggara), lei lei (Alor), no taum, wep taum (Timor), kehkeh-kehkeh (New Guinea).

Note. The local variant of *I. trifoliata* from New Guinea (Leron River) with very dense indumentum (Verdcourt, 1979) also occurs in India and is described there as *I. karuppiana* Pallithanan. It may represent a (polyploid?) form of *I. trifoliata*.

b. subsp. unifoliolata (Merr.) de Kort & Thijssse, stat. nov.

Tetragonolobus simplicifolius Blanco, Fl. Filip. ed. 2 (1845) 397. – *I. unifoliolata* Merr., Philip. J. Sc. 5 (1910) Bot. 65; Enum. Philip. 2 (1923) 276. – Type: BS 1411 (US), Luzon, Rizal Prov., Morong.

Shrublet. Biramous hairs adpressed with equally long arms. *Leaves* unifoliolate. Stipules narrowly triangular, 1.5–2 mm long; stipellae linear, c. 0.5 mm long, glabrous. Petioles 1–1.5 mm long; blade narrowly elliptic, 16–44 by 2–7 mm, base cuneate, apex acute, mucro 0.2 mm long, lower surface with yellow-brown disc-shaped glands; nerves not visible. *Racemes* up to 5 mm long; bracts narrowly triangular, 0.5–1 mm long, persistent. Pedicels 1.5 mm long. *Flowers* 3 mm long; calyx cup 1 by 1 mm, teeth narrowly triangular, 1.5 mm long; standard elliptic, 3 by 1.5 mm, hairy and latex glands on the back; wings 2.7 by 1 mm, glabrous; keel petals 2.5–3 by 1.5 mm, hairy and with latex glands, margins ciliate, lateral pocket 1 mm long;

staminal tube 2–2.5 mm long, anthers 0.3 by 0.2 mm; ovary glabrous, with glands; ovules 6 or 7. *Pod* descending, straight, laterally flattened, with thickened margins, 7–15 by 1.5 mm, hairy, with yellow-brown disc-shaped glands, endocarp not blotched. *Seeds* 5–7, rounded, laterally flattened, dark brown.

Distribution. Luzon. Map 3 (p. 97).

35. *Indigofera trita* L. f.

a. subsp. *trita*

I. trita L. f., Suppl. (1781) 335; Miq., Fl. Ind. Bat. 1, 1 (1855) 305, Benth., Fl. Austr. 2 (1864) 197; Gillett, Kew Bull., Add. Ser. 1 (1958) 101; Ali, Bot. Botis. 3 (1958) 558; Backer & Bakh. f., Fl. Java 1 (1964) 590; Gillett e.a., Fl. Trop. E. Afr., Legum. 3, Pap. 1 (1971) 303; Ali, Fl. W. Pak. 100 (1977) 78. — Type: *Linnaeus* 923-9 (LINN), India.

I. hedysaroides Lamk., Encycl. 3 (1789) 250. — Type: Herb. Lamarck (P).

I. canescens Lamk., Encycl. 3 (1789) 251. — *I. trifoliata* L. var. *canescens* (Lamk.) Miq., Fl. Ind. Bat. 1, 1 (1855) 313. — Type: Herb. Lamarck (P).

I. coccinea Lour., Pl. Cochinch. (1790) 457. — Type: Herb. Loureiro (BM, n.v.), 'Cantonum Sinarum'.

I. cinerea Willd., Sp. Pl. 3 (1802) 1225. — Type: Herb. Willdenow (B, L microfiche).

I. arcuata Willd., Sp. Pl. 3 (1802) 1228. — Type: Herb. Willdenow (B, L microfiche).

I. rigida Willd., Enum. Hort. Berol. 2 (1809) 780. — Type: Herb. Willdenow (B, L microfiche).

I. leschenaultii DC., Prod. 2 (1825) 223. — Type: Herb. De Candolle (G-DC, ex Hort. Calc., L microfiche), Bengal.

I. timorensis DC., Prod. 2 (1825) 223; Decne., Herb. Timor. Descr. (1835) 140. — *I. trifoliata* L. var. *timorensis* (DC.) Miq., Fl. Ind. Bat. 1, 1 (1855) 313. — Type: Herb. De Candolle (G-DC, L microfiche), Timor.

Shrublet. Biramous hairs adpressed, white, with equally long arms. Stipules narrowly triangular, 1.5–2.5 by 0.4 mm; rachis 12–19 mm long, ultrajugal part 2–7 mm long; stipellae absent. Petiolules 0.5 mm long. *Leaflets* (1–)3, opposite to subopposite, elliptic, the terminal 10–30 by 5–13 mm, the lateral 7–22 by 4–12 mm, base acute to obtuse, apex obtuse to rounded, mucro 0.3 mm long; nerves not visible. *Racemes* 2.5–5(–8) cm long; bracts narrowly triangular, 1–1.5 mm long. Pedicels 0.5–1 mm long. *Flowers* 4 mm long; calyx cup 1 by 1 mm, teeth narrowly triangular, 1–1.5 by 0.4 mm; standard orbicular, 3–4 by 3–3.5 mm, hairy on the back; wings 3–4 by 1 mm, glabrous, margins short-ciliate, keel 3–4 by 1 mm, strigose at lower margin and ciliate, lateral pocket 0.7 mm long; staminal tube 3–3.5 mm long; anthers 0.5 by 0.5 mm; ovary glabrous, when older with hairs, ovules 8–10. *Pods* spreading, straight, linear, rhomboid in cross-section, 17–25 by 1.5–2 mm, short-beaked, strigose; endocarp not blotched. *Seeds* 7–10, laterally a bit flattened, quadrangular in cross-section, 2 by 1.2 mm, dark brown.

Distribution. Pakistan, India, Sri Lanka, Burma, Java, Sumba, Flores, Wetar, Timor, N. Australia, Queensland, New South Wales.

Habitat. Grassy localities, eucalypt savanna. Altitude 0–150 m.

b. subsp. *scabra* (Roth) de Kort & Thijssse, *comb. nov.*

- I. scabra* Roth, Nov. Pl. Sp. (1821) 359. – *I. subulata* Vahl ex Poir. var. *scabra* (Roth) Meikle, Kew Bull. 5 (1951) 352; Gillett, Kew Bull., Add. Ser. 1 (1958) 100; in Hutch. e.a., Fl. W. Trop. Afr. 1, 2 (1958) 541. – *I. trita* L. f. subsp. *subulata* (Vahl ex Poir.) Ali var. *scabra* (Roth) Ali, Bot. Notis. 3 (1958) 558; Gillett e.a., Fl. Trop. E. Afr., Legum. 3, Pap. 1 (1971) 304; Verdc., Man. New Guinea Legum. (1979) 356. – Type: *Heyne s.n.* (L holo, K iso), Ind. Or.
- I. mucronata* Spreng. ex DC., Prod. 2 (1825) 227. – Type: Herb. De Candolle: *Bertero s.n.* (G-DC, L microfiche), Jamaica.
- I. jamaicensis* Spreng., Syst. Veg. 3 (1826) 277. – Type: *Bertero s.n.* (n.v.), Jamaica.
- I. flaccida* Koenig ex Roxb., Fl. Ind. 3 (1832) 375; W. & A., Prod. (1834) 204. – Type: Ic. Roxb. 384 (K).
- I. marginulata* Grah. ex W. & A., Prod. (1834) 204. – Type: *Wallich 5467* (K).
- I. quartiniana* A. Rich., Tent. Fl. Abys. 1 (1847) 183, p.p. – Type: *Quartin Dillon s.n.* (K), Ethiopia.
- I. coronilloides* Jaub. & Spach, Ill. Pl. Or. (1857) t. 485–6. – Type: Plate 485–6 in Jaub. & Spach l.c.
- I. spachii* Baker, Fl. Trop. Afr. 2 (1871) 92. – Type: *Schimper s.n.* (n.v.).
- I. umbraticola* Vatke, Oest. Bot. Zeit. 26 (1878) 202. – Type: *Hildebrandt 1386* (K, L), Somaliland, Meid.
- I. retroflexa* Baill., Bull. Soc. Linn. Paris 1 (1883) 399; Baker f., Legum. Trop. Afr. (1926) 145. – Type: *Grandidier s.n.* (P, K photo), Madagascar, Tulle'ar.
- I. laotica* Gagnep. in Lecomte, Not. Syst. 3 (1914) 123; Fl. Gén. I.-C. 2 (1916) 438. – Type: *Thorel 2315* (P), Laos, Kong.
- I. rutschuruensis* De Wild., Bull. Jard. Bot. Etat, Brux. 8 (1923) 155. – Type: *Bequaert 6279* (BR, K photo), Zaire.

Shrub; branches striate. Biramous hairs white, adpressed; arms equally long, unequally long as upper leaflet surface. Stipules narrowly triangular to linear, 4–6 by 0.2 mm; rachis 4.5–6.5 cm long, ultrajugal part 1–3 mm long, stipellae absent. Petioles 1–1.5 mm long. *Leaflets* 7–9, opposite, elliptic, 9–13 by 6–8 mm, base obtuse, apex rounded, mucro 0.5 mm long; nerves hardly visible. *Racemes* 4–10 cm long; bracts narrowly triangular to linear, 2.5 mm long. Pedicels 1 mm long. *Flowers* 3.5–4.5 mm long; calyx cup 1 by 1 mm, teeth narrowly triangular to linear, 1.5–2 mm long; standard rhomboid, hairy on the back, 4.5 by 4.5 mm; wings 4 by 2 mm, glabrous; keel 4 by 2 mm, hairy at lower part, rest glabrous, lateral pocket c. 1 mm long, margins short-ciliate; staminal tube 3.5 mm long, anthers 0.3 by 0.3 mm; ovary hairy on lateral sides; ovules 8–10. *Pod* descending, straight, linear, rhomboid in cross-section, 20–25 by 1.5–2 mm, hairy; endocarp blotched. *Seeds* 7–10, quadrangular, 2 by 1.2 mm, dark brown.

Distribution. Tropical America, tropical and South Africa, Madagascar, India, Sri Lanka, Thailand, Laos, New Guinea.

Habitat. Grasslands, open forests. Altitude 0–300 m.

Note. Ali (1958) made a study of the material under the names *I. subulata*, *I. scabra* and *I. trita* and recognized 4 taxa: 2 subspecies of *I. trita* with each 2 varieties. We recognize only 3 taxa, all subspecies of *I. trita*. Only two occur in the area under consideration, the third one is the African *I. trita* subsp. *subulata*. The synonymy of it runs as follows:

c. subsp. subulata (Vahl ex Poir.) Ali

- I. trita* L. f. subsp. *subulata* (Vahl ex Poir.) Ali var. *subulata* Ali, Bot. Notis. 3 (1958) 558. — *I. subulata* Vahl ex Poir. in Lamk., Encycl. Suppl. 3 (1813) 150; Meikle, Kew Bull. (1950) 351; Gillett, Kew Bull., Add. Ser. 1 (1958) 100; in Hutch e.a., Fl. W. Trop. Afr. 1, 2 (1958) 541. — Type: *Thonning s.n.* (P holo, C, K photo).
- I. thonningii* Schum. & Thonn., Beskr. Guin. Pl. (1829) 366. — Type: *Thonning s.n.* (C).
- I. tetragonoloba* E. Meyer, Comm. Pl. Afr. Austr. (1836) 106. — Type: *Drège s.n.* (n.v.), Natal.
- I. quartiniana* A. Rich., Tent. Fl. Abys. 1 (1847) 183, p.p. — Type: *Quartin Dillon s.n.* (n.v.), Ethiopia.
- I. dimorphylla* Schinz, Verh. Bot. Ver. Brand. 30 (1888) 164. — Type: *Schinz s.n.* (n.v.), South-west Africa.
- I. spachii* Baker var. *trifoliata* Schweinf., Bull. Herb. Boiss. 4 (1896) 240. — Type: *Schweinfurth & Riva 648* (K), Eritrea.
- I. carinata* De Wild., Bull. Jard. Bot. Etat, Brux. 8 (1923) 147. — Type: *Bequaert 5383* (BR, n.v.).
- I. subincana* N.E. Brown, Kew Bull. (1925) 155. — Type: *Rogers 22560* (K), Transvaal.
- I. strigulosa* Baker f., Legum. Trop. Afr. (1926) 143. — Type: *Gossweiler 5882* (BM).
- I. subulata* Vahl ex Poir. var. *microphylla* Chiov., Fl. Somalia 1 (1929) 138; Ali, Bot. Notis. 3 (1958) 558; Gillett, Kew Bull., Add. Ser. 1 (1958) 100. — Types: *Puccioni & Stefanini 319, 366* (K), Somalia.
- I. maffei* Chiov., Att. Ist. Bot. Pav. Ser. IV, 7 (1936) 128, t. 5. — *I. subulata* Vahl ex Poir. var. *maffei* (Chiov.) Gillett, Kew Bull., Add. Ser. 1 (1958) 101. — *I. trita* L. f. subsp. *subulata* (Vahl ex Poir.) Ali var. *maffei* (Chiov.) Ali, Bot. Notis. 3 (1958) 558. — Type: *Pollacei & Maffei 124* (n.v.).
- I. oreophylla* Sant. & Panth., J. Bomb. Nat. Hist. Soc. 54 (1956) 221. — Type: *Santapau 20281* (K).
- I. subulata* Vahl ex Poir. var. *nubica* Gillett, Kew Bull., Add. Ser. 1 (1958) 100. — Type: *Schweinfurth 1812* (K, BM).

Indigofera trita subsp. *subulata* differs from subsp. *trita* in having longer racemes (6–20 cm long) and descending pods (spreading in subsp. *trita*). *I. trita* subsp. *subulata* differs from subsp. *scabra* in having 3 leaflets (7–9 in subsp. *scabra*).

36. Indigofera wightii Grah. ex W. & A.

- I. wightii* Grah. ex W. & A., Prod. (1834) 202; Gagnep., Fl. Gén. I.-C. 2 (1916) 434. — Type: *Wallich 5458* (K), India.
- I. inamoena* Thw., Enum. Pl. Zeyl. (1859) 83. — Type: *Thwaites 3513* (K, P), Sri Lanka.
- I. cinerascens* Franch., Pl. Delav. (1890) 153. — Type: *Delavay 519* (P), China, Yunnan, Ta-pintze.
- I. pallida* Craib, Kew Bull. (1927) 56; Fl. Siam. Enum. 1 (1928) 380. — Type: *Kerr 3083* (BM, K, SING), Thailand, Maharat, Lampang.

Branches erect, sometimes striate. Biramous hairs adpressed, white, with equally long arms. Stipules narrowly triangular, 1–2 mm long; rachis 3–11 cm long, ultrajugal part 1–3 mm long; stipellae linear, 0.5–1 mm long, persistent. Petiolules 0.5–1 mm long. Leaflets (7–19–)21–37, opposite, elliptic to obovate or narrowly elliptic, 3–10 by 2–5 mm, base acute to obtuse, apex acute to emarginate, mucro 0.1 mm long; nerves not visible. Racemes 3–8 cm long; bracts narrowly triangular, 1 mm

long, not exceeding the buds. Pedicels 0.5 mm long. *Flowers* 4–6 mm long; calyx cup 1 by 2 mm, teeth triangular, 1–1.5 by 0.4–0.7 mm; standard elliptic, 4–5.5 by 3 mm, hairy on the back; wings 3–4 by 1–1.5 mm, glabrous; keel petals 4–5 by 1.5–2 mm, hairy, upper margin ciliate, lateral pocket 0.5–1 by 0.5 mm; staminal tube 3–4 mm long, anthers 0.4 by 0.3 mm; ovary glabrous; ovules 9–13. *Pod* straight, ascending or spreading, round in cross-section, beaked, 20–30 by 2–2.5 mm, hairy; beak 1 mm long; endocarp blotched. *Seeds* 8–10.

Distribution. India, Sri Lanka, China (Yunnan), Thailand, Laos, Cambodia, Vietnam.

Habitat. Deciduous forests. Altitude 100–2000 m.

Vernacular name. Nao kao (Thailand).

37. *Indigofera zollingeriana* Miq.

I. zollingeriana Miq., Fl. Ind. Bat. 1, 1 (1855) 310; Merr., Enum. Borneo (1921) 302; Enum. Philip. 2 (1923) 276; Craib, Fl. Siam. Enum. 1 (1928) 383; Backer & Bakh. f., Fl. Java 1 (1964) 592; Verdc., Man. New Guinea Legum. (1979) 357. – Type: *Zollinger 2390* (P, holo; BM, BO, U), Java.

I. teysmannii Miq., Fl. Ind. Bat. 1, 1 (1855) 1083; Sum. (1960) 114; Koord., Atlas 1 (1913) t. 20; Gagnep., Fl. Gén. I-C. 2 (1916) 429. – Type: *Teijsmann HB 867* (U), Sumatra.

I. benthamiana Hance, Ann. Sc. Nat. Bot. IV, 18 (1862) 219. – Type: *Hance 6063* (K), China, Whampoam.

I. galeoides DC. var. *liukuensis* Matsumura, J. Coll. Sci. Univ. Tokyo 12 (1899) 402. – *I. okinawae* Ohwi, J. Jap. Bot. 12 (1936) 659. – *I. kotoensis* Hayata var. *liukuensis* (Matsumura) Ohwi, Acta Phytotax. Geobot. 12 (1943) 111. – Types: *Tanaka 338* (n.v.), *Ito 1375* (n.v.), Ryukyu, Iniomote.

Shrub or small tree, 2–12 m high, girth up to 80 cm; branches erect, not striate. Biramous hairs adpressed, arms equally long. Stipules linear, 6 mm long; rachis 10–20 cm long, ultrajugal part 10 mm long; stipellae 1.5 mm long. Petiolules 1.5–2 mm long. *Leaflets* 11–23, opposite, narrowly elliptic to narrowly ovate, 35–85 by 10–25 mm, base acute to rounded, apex acute to rounded, mucro 1 mm long; nerves not distinct. *Racemes* 8–10 cm long; bracts narrowly triangular, 2 mm long. Pedicels 4 mm long. *Flowers* 4.5–6.5 mm long; calyx cup 1 by 2 mm, teeth deltoid, 0.5 by 0.5 mm; standard ovate, 4.5–5 by 3.5–4 mm, hairy on the back; wings 3–3.5 by 1.5 mm, glabrous, margin short-ciliate; keel petals 4–4.5 by 1.5 mm, hairy, especially at the apex, margins short-ciliate, lateral pocket 0.5 mm long, straight; staminal tube 4.5 mm long, anthers 1 by 0.5 mm, hairy at the top; ovary glabrous; ovules 18. *Pod* spreading, straight, round in cross-section, beaked, 25–40 by 5 mm, with few hairs, indehiscent; beak 2 mm long; endocarp blotched. *Seeds* c. 16, lens-shaped, 3 by 3 mm, arranged like a pile of coins.

Field notes. Branches horizontal, foliolate in layers, inflorescence held erect above branches. Standard chestnut-brown outside, reddish inside; wings salmon red; keel petals white, flushed with pink.

Distribution. China (Kwangsi, Kwantung), Ryukyu I., Thailand, Laos, Vietnam, Luzon, Panay, Leyte, Samar, Mindanao, Malaya, Sarawak, Sabah, Batu I., Bangka,

Java, Celebes, Moluccas, Kangean Arch., Bali, Flores, Babar I., New Ireland. Map 4 (p. 97).

Habitat. Coral strands, sandy beaches. Altitude 0–850 m.

Vernacular names. Kham pa, khi mot, kot mot, sa kham, sak lip pha, 'thoua pa (Laos), marmojo gunung (Java).

38. *Indigofera caudata* Dunn

I. caudata Dunn, Gard. Chron. 11 (1902) 210. – Type: *Henry 12166, a, b* (K), China, Yunnan, Szemao.

Shrub, 1–2 m high; branches erect. Biramous hairs spreading, brown and white, arms equally long. Stipules narrowly triangular, 6 mm long; rachis faintly winged, wings 0.2 mm broad, rachis 5–10 cm long, ultrajugal part 5 mm long; stipellae narrowly triangular, 1–1.5 mm long. Petiolules 2–3 mm long. *Leaflets* 9–11, opposite, narrowly elliptic to narrowly ovate, 30–45 by 13–23 mm, base cuneate to obtuse, apex acute, mucro 1–1.5 mm long, upper surface glabrous, lower surface with brown and white hairs, the brown ones on the nerves; nerves conspicuous, c. 8 alternating pairs. *Racemes* 9 cm long; bracts narrowly triangular, 2 mm long. Pedicels 2 mm long. *Flowers* 7–9 mm long; calyx cup 1 by 2.5–3 mm, teeth deltoid, 0.5–1 by 1 mm; standard ovate, 7 by 6 mm, hairy on the back; wings 5 by 2 mm, hairy, margins short-ciliate; keel petals 8 by 3 mm, hairy, margins short-ciliate, lateral pocket 1–1.5 by 1 mm; staminal tube 6 mm long, anthers 1 by 0.5 mm; ovary hairy; ovules 12–15. *Pods* ascending to spreading, straight, apex slightly recurved, round in cross-section, 35–45 by 2–3 mm, with brown hairs; endocarp blotched. *Seeds* 10–12.

Field notes. Flowers white.

Distribution. China (Yunnan), Laos.

Habitat. Altitude 1350–1500 m.

Vernacular name. Kho khi be (Laos).

Note. This species is described from material in the herbarium of Paris. Mr. Nguyen Van Thuan (pers. comm.) distinguished it as a new species. In our opinion the characters possibly fit with the original description of *I. caudata* Dunn (from China). We will leave it to Mr. Nguyen Van Thuan to match the material or to describe it validly.

39. *Indigofera spec.* A

[Description made from *Poilane 8679* (P), Vietnam, Annam, Ca-Na, near Phanrang.]

Shrub, 1 m high; branches erect. Biramous hairs adpressed, arms equally long. Stipules narrowly triangular, 1.5 mm long; rachis 3–11 cm long, slightly (0.2 mm) winged, ultrajugal part 5 mm long; stipellae narrowly triangular, 1 mm long. Petiolules 4–5 mm long. *Leaflets* 3–9(–11), opposite, narrowly ovate, 30–72 by 15–35 mm, base cuneate to obtuse, apex acute, mucro 1–2 mm long, upper surface glabres-

cent; nerves visible, venation reticulate. *Racemes* 7–10 cm long; bracts narrowly triangular, 1–2 by 0.3 mm, persistent. Pedicels 2 mm long. *Flowers* 10–15 mm long; calyx cup 1–1.5 by 2–3 mm, teeth triangular, 1–1.5 by 0.5–1 mm; standard ovate, 11 by 7 mm, hairy on the back; wings 8 by 2.5 mm, glabrous; keel petals 11 by 4 mm, hairy, margins short-ciliate, lateral pocket 1–1.5 by 1 mm; staminal tube 10 mm long, anthers 1 by 0.5 mm, with a tuft of hairs at the base; ovary hairy; ovules 16. *Pods* spreading to slightly descending, straight, round in cross-section, beaked, 50–60 by 2–3 mm, with few hairs, dehiscent; endocarp blotched. *Seeds* 10–12.

Field notes. Flowers white or pinkish white.

Distribution. Vietnam.

Habitat. Dry rocky soil, clayish soil. Altitude 200–1200 m.

Note. This species is described from material in the herbarium of Paris. Mr. Nguyen Van Thuan (pers. comm.) distinguished it as a new species. We are not quite sure that species A cannot be some Chinese species, but we have not had the opportunity to compare this species with Chinese species. We will leave it to Mr. Nguyen Van Thuan to match it with already described species or to describe it validly.

ERRONEOUSLY RECORDED SPECIES

Craib (Fl. Siam. Enum. 1, 1928, 377) recorded *Indigofera cylindracea* Grah. ex Baker from Thailand. The specimens lack the typical long pedicels and belong to *Indigofera emmae*.

IDENTIFICATION LIST OF COLLECTIONS

Indigofera

- | | | |
|-----------------|-------------------------|---------------------------|
| 1. aralensis | 18. laxiflora | 31. squalida |
| 2. arrecta | 19. linifolia | 32. suffruticosa |
| 3. atropurpurea | 20. linnaei | 32a. subsp. suffruticosa |
| 4. bella | 21. luzonensis | 32b. subsp. guatemalensis |
| 5. brunoniana | 22. minbuensis | 33. tinctoria |
| 6. caloneura | 23. nigrescens | 34. trifoliata |
| 7. cassioides | 24. nummularifolia | 34a. subsp. trifoliata |
| 8. colutea | 25. oblongifolia | 34b. subsp. unifoliolata |
| 9. cordifolia | 26. parkesii | 35. trita |
| 10. decora | 27. reticulata | 35a. subsp. trita |
| 11. dosua | 28. emmae | 35b. subsp. scabra |
| 12. galeoides | 29. sootepensis | 35c. subsp. subulata |
| 13. glabra | 29a. subsp. sootepensis | 36. wightii |
| 14. glandulosa | 29b. subsp. acutifolia | 37. zollingeriana |
| 15. hirsuta | 30. spicata | 38. caudata |
| 16. kerrii | 30a. var. spicata | 39. spec. A |
| 17. lacei | 30b. var. siamensis | |

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Galega

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Hedysarum

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erinaceum = 24

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 - var. nubica = 35c
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ADDITIONAL NOTE

28. *Indigofera emmae*, *spec. nov.* — See pp. 130–131.

Note. In our original manuscript we called this species *I. sesquipetalis*, following a preliminary identification found on one of the studied specimens. After the manuscript was already in the printer's hands, Dr. Sanjappa (Botanical Survey of India) wrote that he had applied the same name for a different species, and that his manuscript was in a proceeded stage of being published. In order to avoid homonymy, we decided to change the name of our species into *Indigofera emmae*, named after Ms. Emmy van Nieuwkoop, lay-out editor of this journal, who suffered most from this uncomfortable name change.